

# The Mining And Metallurgical Journal

VOL. XXII. NO. 6

LOS ANGELES, CAL.,

December 15, 1899,

NEW YORK, N. Y.

Price 15 Cents

## ASSAYER and CHEMIST

Mark samples plainly, advise by letter of full details, with charges enclosed. Postage on ore one cent per ounce.

C. H. VOLLM

34 Roxwell Bldg.

SEATTLE, WASHINGTON

Oiled and Paraffined Canvas Covering for Machinery, etc.

## Tents and Canvas Sheeting

JOHN HARRISON,

167 South Street, - - - New York

## PATENTS!

TOWNSEND BROTHERS  
SOLICITORS  
OF PATENTS

Patents on Inventions secured in all countries. Copyrights, Trade Marks and Labels. OFFICE, 321 Potomac Block, Los Angeles, Cal. Telephone 347.

The Edward P. Allis Company  
MILWAUKEE, WISCONSIN

SEE PAGE 11a



## DANIEL'S P.P.P. ROD PACKING

FOR ALL RODS:

Steam, Water, Ammonia, etc.

You get your money's worth, or you get your money back.

TRY IT.

QUAKER CITY RUBBER COMPANY,  
409 MARKET ST., PHILADELPHIA, or 21 SO. CANAL ST., CHICAGO.

## Joseph Dixon Crucible Co.

MINERS, IMPORTERS AND MANUFACTURERS

## GRAPHITE & PLUMBAGO

JERSEY CITY, N. J.

RETORTS, CRUCIBLES, GRAPHITE LUBRICANTS, BELT DRESSING, GRAPHITE PAINTS, LEAD PENCILS, AND GRAPHITE PRODUCTS OF ALL KINDS.

Send for Production Catalogue.

Graphite Makes the Best Lubricant and Best Paint.

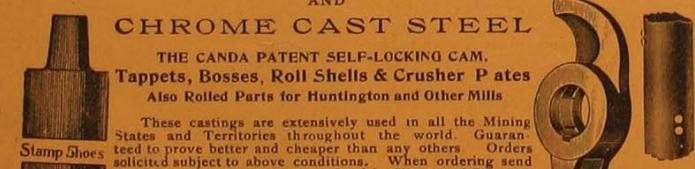
## ADAMANTINE SHOES & DIES

AND

## CHROME CAST STEEL

THE CANDA PATENT SELF-LOCKING CAM.

Tappets, Bosses, Roll Shells & Crusher Plates  
Also Rolled Parts for Huntington and Other Mills



## CHROME STEEL WORKS,

Stamp Dies Kent Ave., Keap and Hooper Sts., BROOKLYN, N. Y.

## The Pelton Water Wheel

Affords the Most Economical and Reliable Power for Mining, Electric and all other purposes.

## 9000 WHEELS NOW RUNNING

PELTON WATER WHEEL CO., 121 Main St., San Francisco, Cal.

Mexican, American and Foreign Patents,  
TRADEMARKS, ETC.

Reports on Mining and Other Properties.  
Proprietors of Weekly Anglo-American, a first-class Advertising Medium.  
Established 9 Years.

C. H. M. y Agramonte,

P. O. Box 388. Cable Address "Agra"

CITY OF MEXICO, MEXICO

THE  
ROESSLER & HASSLACHER Chemical Co.

100 William St., New York

## CYANIDE

Peroxide of Sodium

Hypo-sulphite of Soda

Chloride of Lime

Sulphide of Iron



And Other Chemicals for Mining Purposes.

We are acting as Purchasing Agents for more than thirty mining companies. We desire to make contracts with others to act for them as their Purchasing Agents in this market. Give us an opportunity to send you information and references. We can save you money. Do you wish to receive our Market Letters, giving prices of machinery and supplies, condition of the market, probable change, etc?

Charles H. Miller,

Chicago, Illinois



1543 Marquette Building.

## PARKE & LACY COMPANY

21 and 23 FREMONT STREET, SAN FRANCISCO, CAL.

LICENSEE FOR THE MANUFACTURE AND SALE OF

## The Huntington Centrifugal Roller Quartz Mill

THE HUNTINGTON MILL is so well and favorably known among mining men throughout the world that any description of it would seem superfluous. They are in use in the United States, Canada, Mexico, Central and South America, Australia, China, Japan, and South Africa. In fact, wherever mines exist, and have given the best satisfaction of all quartz crushing mills.

The Construction of this mill has lately been much improved and we claim it to be the CHEAPEST, MOST EFFICIENT, SIMPLEST, AND MOST DURABLE MILL UPON THE MARKET.

Sole Agents for Knowles' Pumps and Pulsometer Pumps, Ingersoll-Sergeant Rock Drills and Air Compressors, Bullock Diamond Drills.

CATALOGUE UPON APPLICATION

Los Angeles, Cal. Office, 306 Byrne Building, W. H. Miller, Representative



JOHN STEWART

MINING ENGINEER

Address:—Mining and Metallurgical Journal  
LOS ANGELES, CAL.

Examines and Reports on Mineral Properties  
Assessment Work Performed for Non-Residents



## Peerless Spiral Piston and Valve Rod Packing

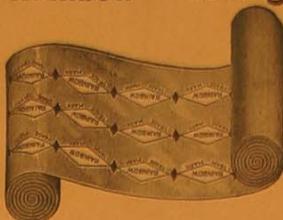
Expressly for High Speed  
Engines. Will Hold 400 lbs.  
Steam. The best packing for  
MINING USE

20 YEARS OLD  
AND NO EQUAL

The Peerless Rubber Mfg. Co., 16 WARREN STREET, NEW YORK



## Rainbow Packing



THE COLOR OF RAINBOW PACKING IS RED

Three rows of Diamonds in Black throughout the length of each and every roll. No baking or following up.



Fac simile of a 6-in section of  
Eclipse Gasket showing name  
and Trade-mark Imbedded

FOR UNION HAND HOLES AND MAN  
HOLES.  $\frac{3}{8}$  in. for pipe unions.  $\frac{1}{2}$  in. for  
hand holes  $\frac{5}{8}$  in. for manholes.  $\frac{3}{4}$  in. for extra  
large man-holes.

16-24 Woodward Avenue, Detroit, Mich. 202-210 S. Water Street, Chicago, Ill.  
Dunham, Carrigan & Hayden Co., San Francisco, Cal.

## California Vigorit Powder Co.

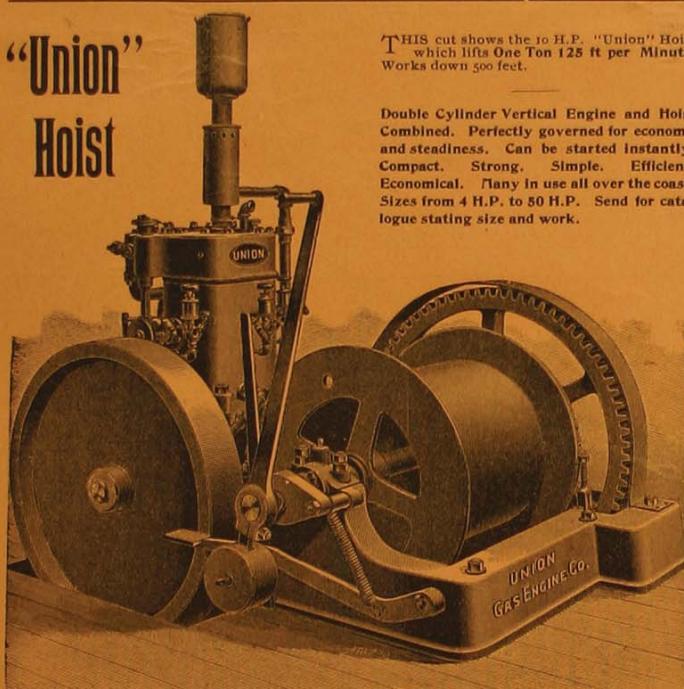
Manufacturers of

Dynamite High Explosives and "Vigorit Low" Blasting Powder

OFFICE: 208 California Street,  
San Francisco, Cal.

WORKS: Point Isabel,  
Contra Costa Co. Cal.

## "Union" Hoist



THIS cut shows the 10 H.P. "Union" Hoist  
which lifts One Ton 125 ft per Minute.  
Works down 500 feet.

Double Cylinder Vertical Engine and Hoist Combined. Perfectly governed for economy and steadiness. Can be started instantly. Compact. Strong. Simple. Efficient. Economical. Many in use all over the coast. Sizes from 4 H.P. to 80 H.P. Send for catalogue stating size and work.

## THOMPSON & BOYLE CO.

(INCORPORATED)

MANUFACTURERS OF

## STEEL MINING PIPE

Cyanide Tanks, Water Tanks, Air Pipe,  
Hydraulic Mining Material

310-314 Requena St.,

Los Angeles, Cal.

## WILLIAM H. EMANUEL,

REPRESENTING

RAND DRILL COMPANY,  
THE EDW P. ALLIS CO.,

Air Drills and Compressors  
General Mining, Milling and Smelting

TRENTON IRON CO.,

Machinery and Reynolds Corliss Engine  
Wire Rope and Bleichert Tramways

HENRY R. WORTHINGTON, General Service and Mining Pumps  
ROBIN'S BELT CONVEYOR

DENVER

COLORADO

The Baker & Adamson Chemical Co.

MANUFACTURERS OF

Strictly Chemically Pure Acids and  
Chemicals and Ashless Filter  
Papers

EASTON, PENNSYLVANIA

## The Standard Authority

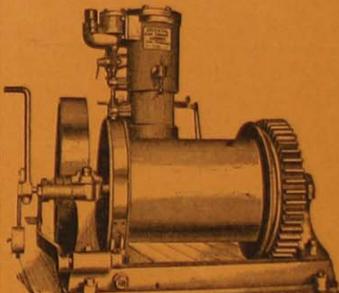
One Volume, Small Quarto, 313 Pages, 72 Illustrations, \$5.00.

A Practical Treatise on  
Hydraulic Mining in California

By AUG. J. BOWIE, JR., Mining Engineer

CONTENTS  
The Records of Gold Washing. General Topography and Geology of California; The Distribution of Gold and Deposits, and the Value of Different Strata; Amount of Workable Gravel Remaining in California; Preliminary Investigations; Reservoirs and Dams; Measurement of Flowing Water; Ditches and Flumes; Various Mechanical Appliances; Blasting Gravel Banks; Tunnels and Sluices; Tailings and Dumps; Washing or Hydraulic Mining; Distribution of Gold in Sluices; Loss of Gold and Quicksilver; Duty on the Miner's Inch; Statistics of the Costs of Working, and the Yield of Gravel.

5  
D. VAN NOSTRAND COMPANY, Publishers  
23 Murray and 27 Warren Sts., New York  
Copies sent by mail on receipt of Price



## ORIENTAL HOIST

Any Size Built on Demand  
Simplest and Best Mining Hoist Built  
Write for Particulars and Prices

## Oriental Gas Engine Co.

227 and 229 Folsom Street,  
SAN FRANCISCO, U.S.A.

## Hoskins' Patent Hydro-Carbon

Blow-Pipe and  
Assay Furnaces



No dust. No ashes. Cheap, effective, economical, portable and automatic. Send for Price-List to

## W.M. HOSKINS,

81 South Clark St., Room 57  
CHICAGO, ILL.

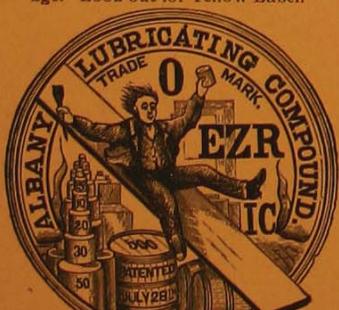
## ALBANY GREASE

Lubricates Everything  
Especially Adapted to Mining and Milling Machinery.

MADE ONLY BY  
ADAM COOK'S SONS,  
313 WEST ST., NEW YORK.

BRANCHES:

TATUM & BOWEN,  
34 Fremont Street, San Francisco, Cal.  
42-49 First St., Portland, Oregon.  
South Canal Street, Chicago, Illinois.



MANUFACTURERS OF  
Albany Dynamo & Albany Cylinder Oils  
If you are not using these Oils give them a trial  
at once, and we know the result. You will want  
no other



# CHAS. C. MOORE & CO.

ENGINEERS AND DEALERS IN

BABCOCK & WILCOX BOILERS.  
McINTOSH & SEYMORE ENGINES,  
HAMILTON CORLISS ENGINES,  
N. Y. SAFETY AUTOMATIC ENGINES,  
GOUBERT FEED WATER HEATERS,  
STRATTON STEAM SEPARATORS,  
SNOW STEAM PUMPS,  
QUIMBY SCREW PUMPS,  
GREEN'S ECONOMIZERS,  
WHEELER CONDENSERS,  
BARNARD-WHEELER COOLING TOWERS,  
HOPPES LIVE STEAM PURIFIERS  
EDMISTON FEED WATER FILTERS,  
BUNDY STEAM TRAPS,  
SPENCER DAMPER REGULATORS,  
HYATT ROLLER BEARINGS.

Watch this Space for description of the above Machinery.

Send for Catalogue and Full Information.

32 First Street, San Francisco, Cal.

**GOODYEAR**  
The Rubber Company.

GATHERING RUBBER.

Crack Proof Boots, White Rubber Coats, Oil Clothing

GOODYEAR RUBBER CO.  
1872

Miners & Mining

BELTING, PACKING AND HOSE

573, 575, 579 Market Street,  
SAN FRANCISCO, CAL.

R. H. PEASE, Vice President and General Manager.

73 and 75 First St.  
PORTLAND, OREGON

GOODYEAR'S  
RUBBER GOODS

—FOR—

EUGENE DIETZGEN CO.  
181 MONROE STREET, CHICAGO.  
149-151 Fifth Ave., New York, N.Y.  
MANUFACTURERS AND IMPORTERS OF  
ENGINEERING and  
DRAWING INSTRUMENTS  
of every description.  
We carry Largest Stock in the West.  
223 PAGE ILLUSTRATED  
CATALOGUE sent on application



### Reliable Assays

Gold ..... \$ .50 Gold & Silver ..... 75  
Lead ..... 50 Gold, Silver, & Copper, 1.50  
Samples by mail receive prompt attention.

RICH ORES AND BULLION BOUGHT  
OGDEN ASSAY CO.,

1420-16th Street, Denver, Colo.

### MACHINERY

NEW AND 2ND HAND  
FOR SALE CHEAP  
Hoisting Engines, Air Com-  
pressors, Rock Drills, Crushers  
Dump Cars, Steam Shovels,  
Light Locomotives, Relaying  
Rail, etc. Send for printed leaf-  
let just issued.

WILLIS SHAW, 629 N.Y. Life Bldg., CHICAGO

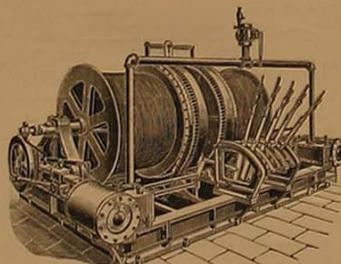
I. C. YAWGER, SUCCESSOR TO VICTOR BISHOP & CO.

IMPORTER OF CARBONS  
FOR DIAMOND DRILLS.

21 Malden Lane, New York

## Lidgerwood Hoisting Engines

Built to gauge on the Duplicate Part System. Quick Delivery Assured. HENSHAW, BULKLEY & CO., Agents, San Francisco.



**Mine Hoists,**  
STEAM AND ELECTRIC  
CABLEWAYS Hoisting and  
Conveying Devices

SEND FOR CATALOGUE

Lidgerwood Mfg. Co.

96 Liberty Street,

New York

**Metcalf, Thomas & Co., INVESTMENT & MINING BROKERS**

Official Agents of the Black Hills Copper Co., Ltd.

OP JEROME ARIZONA.

LONDON AGENCY: Suffolk House  
Cannon St., E. C., London, England.  
Cable Address, METCALF.

224 DOUGLAS BLOCK,

LOS ANGELES, CAL.

## LINK-BELT Elevators and Conveyors



Electric Coal Mining and Haulage Machinery.

Complete Tipple-house equipment, Coal Washing Machinery, Shafting, Pulleys, Shaft Bearings, Friction Clutches, Gearing, etc.

SEND FOR CATALOGUE

**The Link-Belt Machinery Co.**  
ENGINEERS, FOUNDERS, MACHINISTS  
CHICAGO, U. S. A.

Coal Conveyor, 325 ft. center  
handling 4 tons run of  
mine coal per minute

DENVER:  
1328 17th Street  
A. E. LINDROOTH, Manager



## The Mail Dry Gold Saver...

The only thoroughly practical DRY WASHER ever invented, will save a larger per cent. of gold than any other machine. It is Cheap, Light and Durable.

The material used in its construction is of the best, well bolted and screwed (not nailed) together. Woodwork, spruce; lining, galvanized iron; riffle screen, No. 70 mesh, brass wire;

Small size \$35, medium size \$40, large size \$50.

**A. G. GODFREY, Manufacturer,**  
206 S. Los Angeles St., Los Angeles, Cal.

**MATHISON & CO.**  
25-27 CEDAR ST.,  
NEW YORK CITY

—ANTIMONY—

BUY —

ANTIMONY ORES AND  
CRUDE ANTIMONY

WRITE FOR FULL PARTICULARS

# BOOKS ON MINING & METALLURGY.

A CAREFULLY SELECTED LIST OF STANDARD WORKS FOR PRACTICAL MINERS, METALLURGISTS, MINING ENGINEERS AND METAL MANUFACTURERS.

**A Handbook of Metallurgy.** By Carl Schenkel, translated by Henry Louis, two volumes, illustrated, medium Svo. .... \$10.00 net.

Vol. I.—Copper, Lead, Silver, Gold. Vol. II.—Zinc, Cadmium, Mercury, Bismuth, Tin, Antimony, Arsenic, Nickel, Cobalt, Platinum, Aluminum.

The German original is acknowledged to be the best existing work on the subject; and this new translation has the advantages of being well up to date as to its facts and absolutely modern in its descriptions of methods of treatment, etc.

The translators name has long been connected with mining and kindred subjects through his book on "Gold Mining."

**A Manual of Practical Assaying.** By H. Van F. Furman. Fourth edition with five Appendices on most recent methods, Svo, cloth. .... \$3.00

Contents.—Part I. Introductory. Part II. Determinations. Part III. Special Assays and Analysis. Part IV. Calculations.

**Cyanide Processes for Gold and Silver Ores.** By E. B. Wilson, E. M., 12mo, cloth. .... \$1.50

Contents: Introduction—Chapter I., Stamp-mill-work; II., Amalgamation; III., Foundation of Cyanide Process; IV., Chemistry of the Operation; V., Leaching the Ore; VI., Zinc as a Precipitant; VII., Treatment of Bullion; VIII., The Recovery by the Cyanide Process; IX., Laboratory Work; X., Gold and Silver Solvents Combined with Electrical Action; XI., Cyanide Solution with various Electrodes; XII., The Current; XIII., Anodes; XIV., Cathodes; XV., Various Processes and Conclusions; Authors' Useful Information.

**Notes on Assaying.** By P. De Peyster Ricketts, E. M., Ph. D. and Edmund H. Miller, A. M. Ph. D., Svo, cloth. .... \$3.00

Prepared with special reference to the wants of the student and practical assayer. Containing also Instructions for laboratory tests by Cyanide, Chlorination, Russell Process, etc., Assayers' Outfit, Rapid Volumetric Methods for the Analysis of Ores, etc.

**The Alloys and their Constituents.** By Prof. Robt. H. Thurston, Cornell University. Second edition, Svo, cloth. .... \$2.50

Copper, Tin, Zinc, Lead, Antimony, Bismuth, Nickel, Aluminum, etc.; The Brasses, Bronzes, Copper-Tin-Zinc Alloys; Other Valuable Alloys; Their Qualities, Peculiar Characteristics; Uses and Special Adaptations: Thurston's "Maximum Alloys"; Strength of the Alloys as Commonly made and as affected by Special conditions; The Mechanical Treatment of Metals.

**Notes on the Treatment of Gold Ore.** By Florence O'Driscoll, Svo, cloth. .... \$2.00

"It is an interesting discussion of the properties of gold, its occurrences, the methods of procedure in mining in late years, with the losses incident thereto and remedies for the same. The main object in presenting the work has been to make clear a few misconceptions on the subject, the most fatal of these being that any one method of treatment is efficacious in dealing with all classes of gold ores."—American Manufacturer.

**The Chlorination Process.** By E. B. Wilson, E. M., 12mo, cloth. .... \$1.50

Contents: Lixiviation by Chlorine Solutions; Preparation of the Ore-Roasting Furnaces; The Leaching Process; Filtering; Precipitation; Refining the Precipitates; Resume of Chlorination and Plant, Cost of Chlorination.

**Metallurgy of Silver, Gold, and Mercury in the United States.** By Prof. Thos. Egleston, School of Mines, Columbia University. With corrections, Vol. I.—Silver. Svo. .... \$7.50

Showing the latest practice pursued in American Metallurgical Establishments. With 186 engravings and folding plates, tables, etc.

Vol. II.—Gold, Mercury, etc. Illustrated with 140 engravings and folding plates, 935 pages, Svo, cloth. .... \$7.50

These treatises cover the whole range of the metallurgy of silver, gold and mercury in this country; and in a clear, pleasant and interesting manner conveys information of exceeding value to all in any manner interested in the production of these precious metals.—Engineering News.

**Iron and Steel.** By Prof. Robt. H. Thurston, Cornell University. Sixth Edition, revised Svo, cloth. .... \$3.50

The Ores of Iron, Methods of Reduction; Manufacturing Processes, Chemical and Physical Properties of Iron and Steel; Strength, Ductility, Elasticity, and Resistance; Effects of Time, Temperature and Repeated Strain; Methods of Test; Specifications.

"Should be in the hands not only of all Engineers but of all Mine owners and Metallurgists as well."—Mining Review.

**The Coal Mines of the Western Coast of the United States.** By W. A. Goodyear. 12mo, cloth. .... \$2.50

Practical Mine Ventilation. By E. B. Wilson, M. E. Fifth edition with plates, 16mo, cloth. .... \$1.25

For the use of Mining Engineers, Students and Practical Men. "We recommend it heartily to our Mining community."—Colliery Guardian (London).

**Hydraulic and Placer Mining.** By E. B. Wilson, M. E., 12mo, cloth. .... \$2.00

Contents: Uses of Water in Mining; Geology of Placer Deposits, Gold Recovery by various methods; Panning, Cradles, Long Tom, Booming, Sluicing, Rifles, Flumes, Ditches, Dams, Pipes, Giants, Valves, Gates, Wires, Miner's Inch, Pressure Box, Dust Gravel Elevators, Exploiting, Dredging Rivers, Traction Dredgers, Appendix containing Location of Claims and General Information.

**The Modern High Explosives—Nitro-Glycerine and Dynamite.** By Manuel Eissler, Mining Engineer. With many illustrative plates. Third edition, Svo, cloth. .... \$4.00

Their Manufacture, their Use and their Application to Mining and Military Engineering; Pyroxylite or Gun Cotton, the Fulminates, Picrates, and Chlorates; also, the Chemistry and Analysis of the Elementary Bodies which enter into the Manufacture of the principal Nitro-Compounds.

**The Ventilation of Mines.** By J. T. Beard, C. E., E. M., Secretary of the State Board of Examiners for Mine Inspectors, Iowa. 12mo, cloth. .... \$2.50

Designed for use in Schools and Colleges and for practical mining men in their study of the subject.

**Manual of Mining.** By Prof. Magnus C. Ihlseng, E. M., Ph. D. Third edition, revised and enlarged, Svo, cloth. .... \$4.00

For the use of Mining Engineers and Technical Schools, Treating of Preparation and Exploratory Work, Methods of Mining, Hoisting Machinery, Pumping, Ventilation Shafts, Tunnels, Blasting, Timbering, etc.

The text has been increased by more than fifty pages in order to introduce additional matter pertaining to the design of cars hoisting appliances and fans.

**Catalogue of American Localities of Minerals.** By E. S. Dana. Reprinted from sixth edition of the System. Svo, cloth. .... \$1.00

**Description of Minerals of Commercial Value.** By D. M. Barringer, A. M., LL. B. 168 pages, Oblong, morocco binding. .... \$2.50

A Practical Reference Book for the Miner, Prospector and Business Man, or any Person who may be interested in the Extraction or treatment of the Various Metallic or Non-metallic Minerals and for Students either in Field-work or Laboratory.

**An Introduction to the Study of Metallurgy.** By W. C. Roberts Austen, C. B., F. R. S. New Fourth Edition, Revised and enlarged. With 90 illustrations. Crown octavo. Cloth. .... \$5.00

For those who are beginning to study Metallurgy this work is a desirable guidance to a knowledge of the principles by which the art is rightly practiced. The author treats the subject as a whole, giving no minute descriptions of processes, but choosing typical appliances and indicating their use in connection with groups of metals.

"No English text-book at all approaches this in the completeness with which the most modern views on the subject are dealt with."—Chemical News.

**The Metallurgy of Iron.** By Thomas Turner, Associate of the Royal School of Mines. Illustrated by 80 engravings, octavo, 381 pages, cloth. .... \$5.00

This book is primarily intended for persons who are connected with the manufacture of iron and steel, and who may be assumed to have already some general knowledge of the subject discussed. At the same time the volume may not be without interest to others than those for whom it was specially prepared.

"A most valuable summary of useful knowledge relating to every method and stage in the manufacture of cast and wrought iron. An exhaustive and really needed compilation."—Bulletin of the American Iron and Steel Association.

**A Treatise on Mine-Surveying.** By B. H. Brough, Associate of Royal School of Mines. With 102 illustrations. Octavo, 340 pages, Cloth. .... \$2.50

The work is intended primarily for students; and, at the same time, it will also be found useful as a companion to the standard works of reference on land-surveying. The methods of surveying in the Pennsylvania anthracite mines are fully dwelt on, and the most recent forms of American instruments are described and illustrated. A description is also given of the methods adopted in the survey of metalliferous mine-claims in the Western United States.

"It is the kind of book which has long been wanted, and no English speaking mine agent or mining student will consider his technical library complete without it."—Nature.

**Text-Book of Ore and Stone Mining.** By C. Le Neve Foster, B. A., D. Sc., F. R. S. With Frontispiece and 716 illustrations. Large Octavo, cloth. .... \$10.00

A Text-book of ore and stone mining, for the use of mine owners, mine managers, prospectors and all interested in ore and stone mining.

"Mining engineering is at last adequately treated in this volume, and the different kinds of work that have to be done by the miner in the way of surveying, exploiting, drainage, ventilation, lighting, etc., as well as in the treatment of ores after their excavation, are all very fully treated." The book is accompanied by numerous illustrations. One section is devoted to legislation affecting mines and quarries, while another chapter is devoted to the condition of the miners, their modes of life, and the means for ameliorating their condition and elevating them"—Scientific American.

**Prospecting for Minerals.** A Practical Handbook for Prospectors, Explorers, Settlers and all interested in the Opening-up and Development of New Lands. By S. Herbert Cox. With illustrations. Large crown octavo. .... \$2.00

The object of this volume is to give a sketch of those subjects which underlie the calling of the prospector without encroaching to any great extent upon the provinces occupied by the sciences of mineralogy and geology or the arts of mining and metallurgy. To the practical prospector it may give certain hints and the recognition of minerals with which he is unacquainted, while to the student it may afford an introduction to the subject which will be of use in directing his work into the proper channels.

**Sent Post Paid to any address on receipt of Price.** We will endeavor to secure, for subscribers and customers, any other book on Mining, Metallurgy and kindred subjects.

**The Metallurgy of Gold.** By T. Kirk Rose, B. Sc., Edited by Prof. W. C. Roberts-Austen, C. B., F. R. S. Third edition, Revised. Including the most recent improvements in the Cyanide Process, and a new chapter on Economic Considerations (Management, Cost, Output, etc.) With frontispiece and additional illustrations. Large octavo, handsome cloth. .... \$6.50

Adapted for all who are interested in the gold mining industry, being free from technicalities as far as possible; of especial value to those engaged in the industry,—viz., mill-managers, reduction-officers, etc.

A feature is the description of exact methods employed in particular extraction works—Stamp-batteries of South Africa, Australia, New Zealand, California, Colorado and Dakota; Chlorination works, also, in many parts of the world; Cyanide works of South Africa or New Zealand. These accounts are of special value to practical men.

**Getting Gold.** A Gold-Mining Hand-Book for Practical Men. By J. C. F. Johnson, F. G. S., A. I. M. E. With illustrations. Crown octavo, cloth. .... \$1.50

A compendium, in specially concise form, of useful information respecting the processes of winning from the soil and after-treatment of gold and gold ores, including some original discoveries by the author. Practical information, original and selected, is given to mining company directors, mine managers, quartz-mill operators, and prospectors.

**A Text-Book of Assaying.** By C. and J. J. Berger. For the use of those connected with mines.

Third edition. With numerous Diagrams and Index. Crown octavo. 400 pages. Cloth. .... \$3.25

Prepared to meet the existing want of a practical "handy-book" for the assayer. The author has given the results of a series of experiments showing the effect of varying conditions on the accuracy of the process. Statements like those generally made, that "this or that substance interferes," are insufficient. It is necessary to know under what conditions and extent.

"A really meritorious work, that may be safely depended upon either for systematic instruction or for reference."—Nature.

**Blasting.** By Oscar Guttmann, Assoc. M. Inst. C. E. A Hand-Book for the use of Engineers, and others engaged in Mining, Tunnelling, Quarrying, etc.

With 136 illustrations. Octavo, cloth. .... \$3.50

Mr. Guttmann's "Blasting" is the only work on the subject which gives full information as to the new methods adopted since the introduction of dynamite, and at the same time, the results of many years practical experience both in mining work and in the manufacture of explosives. It therefore presents in concise form all that has been proved good in the various methods of procedure.

**Elements of Metallurgy.** A Practical Treatise on the Art of Extracting Metals from their Ores.

By J. Arthur Phillips, M. Inst. C. E., F. C. S., F. G. S., etc. With 238 illustrations, drawn to scale, and reduced in many instances from working drawings. Royal octavo, 909 pages, cloth. .... \$9.00

Contents:—A Treatise on Fuels and Refractory Materials. A Description of the Principal Metalliferous Minerals, with their Distribution. Statistics of the amount of each Metal annually produced throughout the world, obtained from official sources, or, where this has not been practicable, from authentic private information. The Methods of Assaying the different Ores, together with the Process of Metallurgical Treatment, comprising Iron, Cobalt, Nickel, Aluminum, Copper, Tin, Antimony, Arsenic, Zinc, Mercury, Bismuth, Lead, Silver, Gold and Platinum.

**Tables for the Determination of Minerals.** By Physical Properties ascertainable with the Aid of a few Field Instruments. By Percifor Frazer.

Fourth edition, to which 140 additional species have been added. 12mo, cloth. .... \$1.50

"The purpose of this book is to aid the student in determining minerals by their physical properties as distinguished from the chemical reactions which they give. It is also possible to name the values that it shall be for the main possible by their use, for the student to determine a mineral from its color, lustre, streak, hardness, crystalline form, and cleavage, has been shown by the reception which this book has had through its various editions."—New York Science.

**Electric Smelting and Refining.** A Practical Manual of the Extraction and Treatment of Metals by Electrical Methods.

"The Elektrometallurgie" of Dr. W. Borchers, translated by Walter G. McMillan, F. I. C., F. C. S. With numerous illustrations and folding plates. Large octavo. .... \$6.50

Dr. Borchers's treatise is practical throughout. It confines itself to one branch of electro-chemistry,—viz., electrolysis, a subject which is daily becoming of more and more importance to the practical metallurgist and manufacturer. In the extraction of Aluminum, the refining of copper, the treatment of gold and other metals, electrical processes are fast taking the place of the older methods.

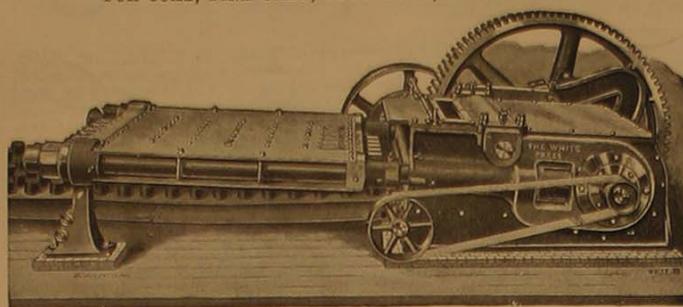
Dr. Borchers's well-known work must be acquired by every one interested in the subject. It is excellently put in English, with additional matter by Mr. McMillan."—Nature.

**The Story of American Coals.** By William Jasper Nicolls, M. Am. Soc. C. E. Buckram, gilt top, deckle edges, with complete index. .... \$3.50

"It is as much historical as scientific, and scientific without being at all technical. The author, Mr. Nicolls, has adopted a pleasing simple style of writing which causes the reader to be loath to lay the book down until it is finished."—Phil. Ledger.

## The White Briquetting Press

FOR COAL, FINE ORES, FLUE DUST, CONCENTRATES



SOLE LICENSEES TO SELL AND OPERATE

### The Henry S. Mould Company,

Carnegie Building

PITTSBURG, PA., U. S. A.

## CYANIDE PROCESS

### The McArthur-Forrest Cyanide Process

IS THE BEST

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Process, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States. Samples Assayed and Fully Reported upon. Properties Examined. Designs furnished. For Terms and Particulars, Address

THE GOLD AND SILVER EXTRACTION CO., of America, Ltd.  
GEO. A. ANDERSON, General Manager

Testing Works: 1716 Blake St., Denver, Colo. 208-210 McPhee Building, Denver, Colorado.  
JESSE J. MACDONALD, Agent, 127 W. First St., Los Angeles, Cal.



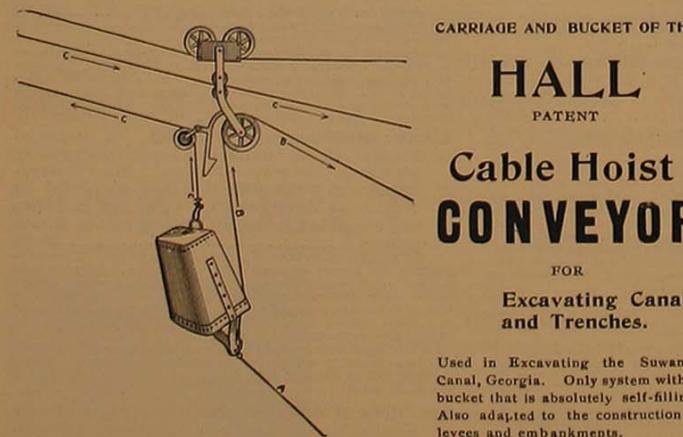
TRADE MARK  
KEUFFEL & ESSER CO.  
NEW YORK.

127 FULTON AND 42 ANN STS.

Branches: 111 Madison St., Chicago; 708 Locust Street, St. Louis, Missouri

Drawing Materials and Surveying Instruments

Largest and best assort'd stock in America. All requisites for field, mine, and draughting room. We have made a study of this line, and our goods are warranted to be as nearly perfect as it is possible to make them. Prices reasonable. Write for catalogue.



CARRIAGE AND BUCKET OF THE

HALL  
PATENT

Cable Hoist  
CONVEYOR

FOR

Excavating Canals  
and Trenches.

Used in Excavating the Suwanee Canal, Georgia. Only system with a bucket that is absolutely self-filling. Also adapted to the construction of levees and embankments.

THE TRENTON IRON CO., Trenton, N. J.,  
MANUFACTURERS.

Also Wire Rope Tramways, Surface and Underground Haulage Plants, etc. Wire Rope of all kinds for regular and special applications. Illustrated Pamphlet on application.

NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.  
CHICAGO OFFICE—1114 Monadnock Building

W. H. EMANUEL, Agent, Denver, Col.

NEWTON M. BELL, Agent, San Francisco.

ESTABLISHED 1820  
YOUNG & SONS.,

Manufacturers of

Engineering, Mining and Surveying Instruments  
Noted for improvements in Auxiliary Telescopes  
for vertical sighting in mines. Makers of the  
inclined standard transits. Non-Extension  
Telescopes, moisture and dust proof. Write for  
special circulars of mining transits.

43 N. Seventh St., Philadelphia Penn.

SAVE MONEY! FUEL COSTS MONEY

Trade-mark  
W. B.  
C.  
FOSSIL MEAL CO.,  
Cedar Street, New York

Protect your pipes and boilers with Wm. Berkfield's Fossil meal composition, packed in sacks, easy to transport anywhere. Send for facts and figures.

IRON AND HEAVY HARDWARE, WOOD MATERIALS, WHEELS, HARDWARE &c., for heavy freight wagons. Blacksmiths and Wagonmakers Tools and Machines. Send for complete catalogues.

Lew E. Aubury,  
Mining Engineer,

ASSAY OFFICE,

118 W. First Street, Los Angeles, Cal.

86-82-84 Michigan Ave., Chicago, Ill.

## Mining Supplies and Steel

Blacksmiths and  
Machinists Supplies  
of all kinds.

Iron and Heavy Hardware, Wood Materials, Wheels, Hardware &c., for heavy freight wagons. Blacksmiths and Wagonmakers Tools and Machines. Send for complete catalogues.

S. D. KIMBARK,

Chicago, Ill.

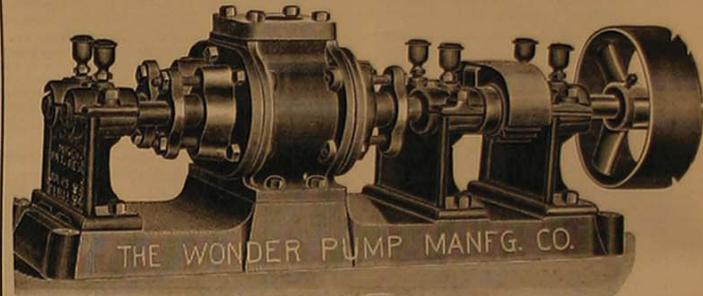
FRANCIS M. SIMONDS, E. M., PH. D.  
Chemical and Mining Engineer.  
METALLURGICAL CHEMISTRY

J. HOWARD WAINWRIGHT, PH. B., F. C. S.  
(late U. S. Gov't Chemist, N. Y., 1883-1898.)  
COMMERCIAL AND TECHNICAL ANALYSTS

SIMONDS & WAINWRIGHT,  
Chemical, Mining Engineers and Analysts,

Telephone 1015 John. Offices and Laboratories: No. 150 Front St., New York City.  
SPECIALTIES: Analysis and Tests of Minerals—Engineering—Examinations of Mining Properties—Experimental Research and Consultation.

## The Improved WONDER Irrigation Pump



We also Build Vertical Style for Mining Purposes.  
Write for full particulars and Catalogue.

Wonder Pump Mfg Co.,

LEAVENWORTH,  
Kansas.

MACHINERY & ELECTRICAL CO., Los Angeles, Cal., Agents for California.

WEIS & GIBSON,  
Assayers and  
Analytical Chemists

8 Clark St., Chicago, Ill.  
Assays and analyses of all kinds. Mail orders  
promptly attended to. Mining properties examined  
and reported upon. Term on application

WM. M. COURTIS, A. M.

Mining and  
Metallurgical Engineer

Assayer and Analytical Chemist

Office: 412 Hammond Building,  
Permanent Address, 449 4th Ave. Detroit, Mich.

THEODOR LEXOW

Nos. 12 to 16 John St., near Broadway, N. Y.  
Importers of

CARBONS

FOR DIAMOND DRILLS and all Mechanica  
Purposes

Henry Demmert

Assay Office and Ore Testing Laboratory

OF HENRY E. WOOD, Assayer

1734 ARAPAHOE ST., DENVER, COLORADO  
Established in Colorado in 1876

Control and Umpire Assays a Specialty. Wilfley Concentrator in Operation. Write for circular giving prices, etc.

HADFIELD'S MANGANESE STEEL,

HARD,  
TOUGH.



Best Metal known for Stamp Shoes and Dies, Roll Shells, Crusher Plates and Side Liners. Toggles and Toggle Bearings, Gyrotary Cones and Concaves or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc., Etc.

TAYLOR IRON AND STEEL CO.,  
Sole Licensees in America under Hadfield System and Patents.  
High Bridge, N. J., U. S. A.  
All Pacific Coast parties interested please address, Parks & Lacy Co., San Francisco, Cal.

# The Mining And Metallurgical Journal

ENCLOSED AT THE POST OFFICE AT LOS ANGELES, CALIFORNIA  
AS SECOND CLASS MAIL MATTER.

VOL. XXII. DECEMBER 15, 1899. No. 6.

F. W. EDELSTEN, Editor.

O. S. BREESE, Associate Editor.

J. A. RAWSON, JR., Business Manager.  
ULRICH KNOCH, Publisher

## MAIN OFFICES

Stimson Block, Los Angeles, Cal.

32 Broadway, New York, N. Y.

### BRANCH OFFICES:

San Francisco, Cal.	64-65 Merchants Exchange
Chicago, Ill.	413, 59 Dearborn St.
Denver, Colo.	402-403 Quincy Bldg.
Salt Lake City, Utah	15 W. Second South St.
Spokane, Wash.	Hypotheek Bank Bldg.
City of Mexico, Mexico	No. 4 Calle de San Juan de Letran

### SUBSCRIPTION PRICE:

For United States, Mexico and Canada	\$2.50 per annum
" " " " "	1.25 six months
All other countries in the postal union	3.50 per annum
" " " " "	1.75 six months

### NOTICE TO SUBSCRIBERS.

Subscribers not receiving their copy of the JOURNAL regularly, whether ordering through agent or direct, will kindly notify the Los Angeles, Cal., office.

ISSUED SEMI-MONTHLY

ADVERTISING RATES FURNISHED ON APPLICATION.

## TABLE OF CONTENTS.

Editorials	
California State Mining Bureau	65
Congress in Session	65
International Mining Congress	65
Transvaal Gold Production	66
Miscellany	
*New Solar Attachment, A	67
Receiver asked for United Verde	67
Difference in Magnetic Needles. By C. L. BERGER, (To be Continued)	68
Cold Expansion of Metals, By L. LODIAN, C.E.	69
Mineral Resources of Siberia, By A. J. STONE	71
Mexican Onyx	72
*Illustrated.	
Correspondence	
Arizona	72
Mexico	72
Utah	73
Washington	73
Miscellaneous Mining News	
Alaska	73
Arizona	73
California	73
Colorado	74
Michigan	74
Missouri	74
Montana	74
Nevada	75
New Mexico	75
Oregon	75
South Dakota	75
Utah	75
Washington	75
Foreign Mining News	
British Columbia	76
Mexico	76
Latest Mining Decisions	76
General News	
California Iron	76
Personals	77
New Incorporations in Mining and Metal Industries	77
The Markets	
Metals	7a
Acids	7a
Chemicals	7a
Financial Notes	
Average Prices of Metals	8a
Average Monthly Prices of Silver	8a
Money in Circulation	8a
Money in Treasury	8a
Gold and Silver Exports and Imports	8a
Incorporated Mines Paying Dividends	10a

## CALIFORNIA STATE MINING BUREAU.

The trials and tribulations of State Mineralogist Cooper are not at an end yet, but a little energy displayed will set the wheels of justice moving in the right direction.

The Register of Mines and Minerals which was in process of compilation has not been printed, because the State Printer has so much useless matter to print that there is no time to spare for the valuable work of the State Mining Bureau.

Now the Bureau is without funds, and can do nothing at all. The following, taken from the San Francisco *Call* portrays the situation as it stands:

"The miners of the State will be delighted to learn that the State Mining Bureau is in an inchoate and dirty political mess as the result of a bold but fool patronage grabbing play by a few politicians with Governor Gage apparently playing the role of chief bandit. This important State institution, from which the mining interests rightly expect much, is paralyzed and has been for months, so far as its most important functions go, as the result of an attack by the spoilsman. The bureau has suffered more or less from the curse of practical politics before, but now it seems completely mired in this familiar slough.

"California now has two State Mining Bureaus at loggerheads with each other. One—the old one—is mired at the ferry building with just enough money to keep open and in quiet operation the fine museum, library, assay laboratory and Bureau of Information with which it is equipped by law and in fact, but with no money to go out into the hills and deserts with the miners who need its aid. The other is a new one, run by Governor Gage, fancy free, with \$20,000 and all out-doors.

"Then there comes into view in the rear the interesting development that this new gubernatorial bureau of science and industry is probably illegal and that its \$20,000 will probably be taken away from it by the courts whenever anybody makes a legal assault on it, as somebody is likely to do before it acquires a very long history. And while viewing these troubled institutional twins one may hear the political pulls fairly creaking as the mess grows more involved."

## CONGRESS IN SESSION.

There have been hints thrown out for months as to what the majority in Congress would do on the money question, but nothing very definite could be learned though the whole country was anxious to find out what would likely transpire. Self-constituted committees of both the House and Senate have had the subject under consideration, and at the very opening of Congress the bill proposed by the Senate committee is promulgated, and hence the country is definitely advised of its character. There are some differences between the two committees of the Republican party which have had the subject under consideration.

The bill of the Senate Committee provides in substance:

First. That the dollar consisting of 25.8 grains of gold nine-tenths fine shall be the standard unit of value, and that all forms of money issued or coined by the United States shall be maintained on a parity of value with that standard, and that all United States notes and Treasury notes issued under the Act of

July 14, 1890, when presented to the Treasury for redemption shall be redeemed in gold coin of such standard.

Second. For this purpose the Secretary of the Treasury shall set apart \$150,000,000 in gold coin to be used only in redeeming the notes above mentioned, and when thus taken in they shall not again be issued, except on receipt of an equivalent in gold, and should the Treasury in other ways be unable to obtain gold to maintain the reserve of \$100,000,000 in gold, it is made the duty of the Secretary of the Treasury to borrow money on the credit of the United States by the issue and sale of bonds; the bonds to be of the usual denominations and bearing interest at three per cent.

Third. It is made the duty of the Secretary of the Treasury as fast as silver dollars are coined under the Acts of July 14, 1890 and June 30, 1899, from the bullion in the Treasury to retire and cancel an amount of Treasury notes equal to the silver dollars so coined and on which shall be issued silver certificates.

Fourth. That after the passage of the act no United States or Treasury notes shall be issued of less denomination than \$10, and when notes of a less denomination shall be received in the Treasury they shall be cancelled. No silver certificates shall thereafter be issued in less denomination than \$10, and when such are received they shall be cancelled and \$10 certificates issued in their stead.

Fifth. The bill contains provisions authorizing the Secretary of the Treasury to refund the outstanding bonds bearing five and four per cent interest by the issuance and sale of new and long time bonds bearing interest at two per cent.

Sixth. It authorizes the National banks to issue notes to face value of their deposited bonds instead of ninety per cent as now allowed by law, and in case the bonds go below par in the market, the Controller of the Currency may require an additional deposit of bonds to cover the deficiency. After the passage of the Act the banks should not issue notes under \$10.

Seventh. When the National Banks shall deposit two per cent bonds as security for their circulation, they shall pay a tax of one-fourth of one per cent each six months on their circulation, instead of the one per cent tax now imposed by law.

It is understood that the bill of the House Committee contains provisions of a somewhat different character, but generally in principle it concurs with the Senate bill. As the discussion proceeds in Congress we shall have something to say in regard to the general principles of the bill and cognate measures, which the majority in Congress seems disposed to introduce into our financial system.

The bill is ingeniously drawn to avoid rugged issues in the next presidential campaign, and yet in the opening sections there are declarations that tend to the taking of more radical and sweeping steps than are indicated in the subsequent sections.

## INTERNATIONAL MINING CONGRESS.

The third annual session of the International Mining Congress, to be held in Milwaukee, Wis., in June, 1900, on the 19, 20, 21, 22 and 23rd, will be one of the most elaborate affairs connected with mining that has ever been held.

We give below a complete list of all the

Committees and those composing them. In our issue of November 15th, we gave the basis of representation, and wish to impress upon the mind of those interested the necessity of lending what aid is possible to make this convention a grander success than anything held heretofore.

## OFFICERS.

Hon. B. F. Montgomery, Colorado, Pres.  
Irwin Mahon, Colorado, Acting Secretary.  
B. T. Leuzarder, Wisconsin, Ass't Secretary.

## VICE PRESIDENTS.

I. H. Hawley, Idaho; C. T. Lane, California;  
M. Elguera, Peru.

## EXECUTIVE COMMITTEE.

Hon. B. F. Montgomery, Cripple Creek, Colorado, Chairman.  
T. J. Sullivan, Milwaukee, Wis., Secretary.  
Frank E. Johnesse, Dixie, Idaho.  
T. A. Lemon, Chicago, Illinois.  
E. J. Gilbert, Minnesota.  
E. M. Lambkin, Kansas City, Missouri.  
C. C. Rieger, Walkerville, Montana.  
E. B. Sawyer, Lincoln, Nebraska.  
Thos. J. Hurley, Mills Building, New York.  
C. A. Watkins, Elko, Nevada.  
L. S. Preston, Elizabethtown, New Mexico.  
G. M. Williams, Wilkesbarre, Pennsylvania.  
H. Holbrook, Provo, Utah.  
W. Reid, Rawlins, Wyoming.  
Prof. S. B. Christy, University of California, Berkley, California.

## FINANCE COMMITTEE.

E. C. Atwood, Empire, Colorado, Chairman.  
S. B. Milner, Salt Lake, Utah, Secretary.  
P. T. Farnsworth, Salt Lake, Utah  
A. R. Smith, Gainesville, Georgia.  
J. A. Hayes, Boise, Idaho.  
Charles Henrotin, Chicago, Illinois.  
L. D. Gillette, Minneapolis, Minnesota.  
H. H. C. Snail, Missouri.  
E. W. Fisk, Helena, Montana.  
M. A. Lathrop, Omaha, Nebraska.  
M. F. Perry, New York.  
A. J. Demenes, Las Cruces, New Mexico.  
O. W. Kennedy, Scottdale, Pennsylvania.  
A. E. Broadbury, Evanston, Wyoming.  
R. D. Hunter, 58 Clinton St., Chicago, Ill.  
J. D. Bransford, Quincy, Plumas County, California.

CHAIRMAN RECEPTION COMMITTEE,  
Hon. David S. Rose, Milwaukee, Wisconsin.

## GENERAL COMMITTEE.

W. H. Surles. H. H. Rockwell.  
Aug. Uihlein. Albert Blatz.  
Adam Gentleman. Aug. Vogel.  
Wm. Becker. Fred Kasten.  
J. K. Ilsley. L. W. Halsey.  
C. C. Paine. Wm. Bollow.  
Jno. R. Wolf. Jno. Hansen.  
Dr. L. Sherman. Jno. Kearn.  
E. P. Bacon. Dr. Burgess.  
W. H. Ellsworth. G. W. Hazleton.  
Albert Conro. R. G. Richter.  
Wm. C. Viliter. P. R. Hannifin.  
Wm. Veits. Wm. Kieckhefer.  
James Gilowsky. Henry Schranck.  
Conrad J. Niedman. Wm. Geuder.  
W. H. Upmeyer. Henry Smith.  
John Black. V. T. Wakefield.  
Thomas Shea. V. Schoenecker, Jr.  
W. H. Earles, M. D. T. L. Hansen.  
Samuel McCord. J. H. Kopmier.  
Aug. Zinn. C. W. Moody.  
E. P. Bacon. Emil Durr.  
H. M. Pillsbury. A. S. Witherbee.  
J. M. Pereles. A. T. Shea.  
Geo. Ziegler. Adolph Spiegel.  
Wm. Plankinton. H. E. Haskins.  
E. R. Stillman. Frank Boyd.

Cornelius Corcoran. John Graf.  
Wm. Schoen. J. P. Reuter.  
Frank J. Matchette. H. J. Steinman.  
C. W. Milbrath. E. J. Lindsey.  
Robert Hill. W. H. Meyer.  
W. H. Starke.

## LOCAL EXECUTIVE COMMITTEE

John C. Koch, Chairman.  
Hon. E. R. Stillman, Vice-Chairman.  
T. J. Sullivan, Secretary.  
W. D. Gray. J. F. Burnham.  
Louis Auer. A. L. Severance.  
B. T. Leuzarder. J. H. Stover.  
Dr. Wilmot Miller. C. J. Dixon.  
W. G. King. F. T. Terry.  
Henry C. Payne. Irving M. Bean.  
H. P. Myrick. Geo. D. Van Dyke.  
F. W. Rogers. Howard Bosworth.  
Geo. A. Wiswell. Win J. Morgan.  
Eltinge Elmore.

## FINANCE COMMITTEE.

B. T. Leuzarder. Frank J. Kipp.  
Louis Auer. W. F. Miller, M. D.  
C. J. Dixon. N. S. Robinson.  
Sherman Brown. Robert Camp.  
F. T. Terry. E. A. Wadham.  
John E. DeWolf.

## PRESS COMMITTEE.

H. P. Myrick. L. T. Boyd.  
M. A. Hoyt. J. G. Gregory.  
Julius Bleyer. L. W. Nieman.  
Edgar Coleman. Geo. Brumder.  
George P. Mathis. John J. Hannan.  
Charles Lush. James Paul.  
Charles Dean.

## TRANSPORTATION COMMITTEE.

T. J. Sullivan. W. J. Boyle.  
J. H. Martin. J. C. Pond.  
W. H. Dodsworth. W. D. Carrick.  
F. M. Snavely. A. P. Chapman, Jr.  
L. C. Whitney. E. G. Crosby.  
Fred. C. Reynolds. F. A. Butterworth.  
John I. Beggs.

## COMMITTEE ON LATIN REPUBLICS.

Henry C. Payne. E. C. Wall.  
A. L. Cary. Charles Pfister.  
Frank G. Bigelow.

COMMITTEE ON SUBJECTS AND PAPERS.  
I. M. Bean. John Johnstone.  
M. P. Hulst. E. H. Bottum.  
T. W. Spence. Ferd Schleisinger.  
Edwin Reynolds. C. C. Rogers

COMMITTEE ON ESTABLISHMENT BY CONGRESS OF A DEPARTMENT OF MINES AND MINING, AND SUGGESTIONS ON MINING LAWS.

Geo. D. Van Dyke. P. J. Somers.  
A. A. L. Smith. N. S. Robinson.  
J. H. Stover. John S. George.  
H. S. Haselton.

COMMITTEE ON DISPLAY OF MINERALS AND KINDRED INTERESTS.

F. W. Rogers. J. O. Buckley.  
John S. Maxwell.

COMMITTEE ON MINE ENGINEERS, MANAGERS AND SUPERINTENDENTS.

Howard Bosworth John Barth.  
Geo. L. Graves. J. L. Gates.

## COMMITTEE ON EXHIBITS OF MINING MACHINERY.

W. D. Gray. A. W. Robinson.  
F. A. Wilde. H. A. Luedke.  
Theo. Viliter. F. W. Sivyer.

## ENTERTAINMENT.

Geo. N. Wiswell. Rollin Mallory.  
George E. Goodman. Wm. MacLaren.  
E. G. Cowdrey. Geo. W. Peck.  
T. H. Bowles. Ira B. Smith.

W. E. Fitzgerald. J. P. Murphy.  
J. W. P. Lombard. Gus. G. Pabst.  
E. P. Hackett. James Bannen.  
Clement B. Stern. Geo. S. Bartlett.  
Christian Wahl. Fred T. Goll.  
John F. Burnham. Otto A. Finck.  
Walter Reed. F. M. Hoyt.  
L. L. Caty. A. A. Hathaway.  
Henry Hase.

## COMMITTEE ON LODE AND PLACER MINING, MILLING AND SMELTING.

Win. J. Morgan. H. C. Holthoff.  
Samuel Green. Q. A. Burnham.  
Chris. Otjen. Geo. W. Marling.  
F. M. Ruschaupt. Ralph S. MacPherran.  
Geo. P. Mayer.

## COMMITTEE ON FUEL, FIRE CLAY AND CHEMICALS—STONE AND MARBLE.

Eltinge Elmore. J. R. Berthelet.  
H. M. Benjamin. W. D. Halsted.  
Davenport Fisher. A. S. Mitchell.  
W. H. Simpson. W. T. Durand.  
A. K. Hamilton.

## COMMITTEE ON HOTELS.

W. G. King. A. L. Severance.  
Alvin Kletzsch. F. J. Matchette.  
Frank Cole. Aug. Pleiss.  
E. T. Dorman. Fred Schaefer.  
B. J. Bourda. H. S. Hadfield.  
M. Olie.

## TRANSVAAL GOLD PRODUCTION.

History will be made rapidly in South Africa in the next few weeks, and it is reasonable to consider the immediate and the ultimate effect of the impending changes upon the gold output of the region. In the first place, it seems already clear that the great mining properties there will be protected, and even that production will go on as usual in many places. Two powerful forces are at work to prevent the destruction of the mines—first, the fact that the Transvaal Treasury will naturally need all the money it can get to carry on the war, and can most conveniently obtain funds by working the mines and "commandeering" the product; and, second, the fact that the Rand Mines are largely owned, not in England alone, but also on the Continent. A protective police force has already been organized in Johannesburg to guard the mines.

While, therefore, the machinery of gold production will be maintained intact and uninjured in all likelihood, it is also true that Europe must get along for a longer or shorter period without the liberal addition to its gold supply hitherto received from the rich reefs of South Africa. The stoppage is a serious matter, and must be taken into account by the European houses, as the output of the Rand had reached at the outbreak of the war the enormous total of nine millions of dollars a month.

As for the ultimate effects of the war, no one can doubt that the operation of the mines under the protection of the English rule will be greatly facilitated and energized. Freedom from the numerous restrictions heretofore imposed upon the miners will tend to increase production, and especially will this result follow from the overwhelming inrush of capital certain to occur as soon as peace is assured. So recently as 1891 the Transvaal gold product was only about twelve and one-half million dollars, as compared with seventy-three and one-half millions in 1898; but the figures for the next decade, under the new conditions, are likely to be even more surprising.

## A NEW SOLAR ATTACHMENT.

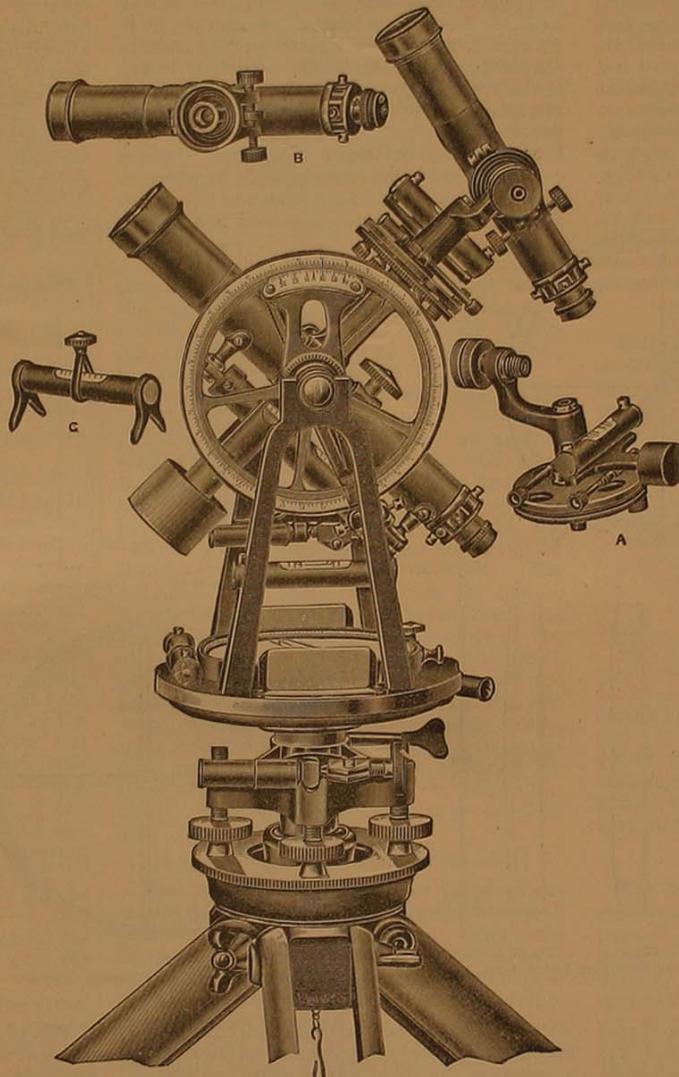
C. L. Berger & Sons' Solar Attachment, recently designed and patented by the firm, illustrated herewith, consists of an equatorial adapter, an auxiliary telescope, and a striding level.

The equatorial adapter made to fit to the upright part on certain of their mining transits, where the auxiliary telescope ordinarily goes, receives the auxiliary telescope and converts it into a solar telescope, permitting it to move in the equatorial circle about a polar axis and in the declination circle of the sun. The adapter consists of two plates provided with leveling screws working against opposing springs which permit the polar axis to be adjusted to the zenith when the main telescope is level and consequently to point to the pole when the main telescope is elevated in the plane of the meridian to intersect the equatorial circle. The lower plate of the adapter screws upon the central vertical part of one mining transit which was originally designed to carry the auxiliary telescope when used as a top telescope.

The upper plate of the adapter carries a small level and the polar axis around which moves the socket carrying an arm in which the declination axis can be made to revolve. The declination axis has at one end a threaded stud similar to those provided for the auxiliary telescope when used as a side or top telescope, and to which the auxiliary telescope can be screwed. To do this it is only necessary to slightly release the innermost nut from its fastenings against the upright and then by turning the declination axis by means of the outer milled headed screw, the auxiliary, now solar, telescope can be securely fastened thereto. The polar axis socket and the upper part of the adapter carries a small level by which the adapter can be adjusted in relation to the transit proper, so that the polar axis will point to the zenith when the main telescope is level. To use the solar attachment screw the equatorial adapter for the central part: level up the transit by means of the plate levels and assuming that all the adjustments of the transit and those of its motion in vertical plane have previously been verified, attach the auxiliary or solar telescope to its part by slightly unloosening the milled headed nut next to the upright carrying the declination axis; then by turning the other milled head firmly fastening the auxiliary telescope to the declination axis. Bring the main telescope level to the width of its tube, where the zero of its vertical circle showed coincidence with the zero of the vernier. Level up the equatorial adapter by revolving it, by means of its level and the two milled headed screws acting against its opposing springs in the lower plate provided for that purpose. This is necessary in order to make the polar axis truly at right angles to the line of collimation of the main telescope. This adjustment once properly made need only be repeated for verification of adjustment from time to time as deemed necessary.

Set off on the vertical circle the declination and refraction of the day and hour of observation; clamp the declination axis tightly to the upright carrying the declination axis by means of the inner milled headed nut, previously taking care that the stud between the two opposing screws shall be nearly in the center when the telescope is nearly in a horizontal position. Place the striding level upon the auxiliary telescope and by means of the two opposing screws place the bubble in the center of its tube.

The two telescopes now occupy a position with each other equal to the declination and



A.—SOLAR EQUATORIAL ADAPTER. B.—INTERCHANGEABLE AUXILIARY TELESCOPE. C.—STRIDING LEVEL.

refraction of the day and hour of observation. Set the vertical circle to correspond to the colatitude of the place of observation and the solar telescope is ready for work. The striding level should be taken over before the solar attachment is set for colatitude and the two telescopes should be placed in the same vertical plane by bisecting with both telescopes some distant object. The cross-wire arrangement in the auxiliary telescope is a square somewhat smaller than the disk of the one which is illustrated in diaphragm No. 2 on page 81 of this firm's catalogue. The coarse wires of the square are equi-distant from the horizontal and vertical central wires and par-

allel thereto, so made to distinguish them from the wires marking the line of collimation of the telescope and thus to avoid mistakes on the part of the observer.

The striding level will prove a valuable adjunct for the setting of the auxiliary telescope when used as a side telescope to read the same level line as the main telescope.

The equatorial adjuster being in part made of aluminum and of brass, weight only nine ounces, the same counterpoise used for the auxiliary telescope may also be used for the equatorial adapter by the exercise of proper care. The observations with this solar attachment are exceedingly simple to make.

The equatorial adjuster raising the auxiliary telescope considerably above the vertical circle, observation can frequently be made if desired without the use of a prism by simply screwing the colored glass furnished with the instrument upon the eyepiece. The observer should set the tripod firmly, giving the legs an unusually wide spread.

## Receiver Asked for United Verde.

Henry G. Atwater, of the law firm of Atwater & Cruikshank, said Nov. 28, that a suit had been brought in the State Supreme court for the appointment of a receiver for the United Verde Copper Company at Jerome, Arizona, and the railroad leading to Jerome Junction from the works. United States Senator William A. Clark is one of the largest stockholders in the company, which is capitalized for \$3,000,000.

Mr. Atwater said that the suit was brought for the purpose of preventing the sale of the property with a view to reorganization of the company. The minor stockholder, who are interested in the proceedings, fear that they are to be frozen out in the reorganization and have taken this means to block the deal. The company was organized under the laws of the state of New York in 1883, but as the laws governing corporations became more severe, it was advisable to give up the New York charter. Out of 300,000 shares the holders of 299,000 voted to dissolve the company as a New York corporation. To this end the property will be sold, but will be bought in by the majority stockholders.

The purpose is to organize a new corporation under the laws of West Virginia, with a capital of \$3,000,000, and to transfer all the property in exchange for stocks and bonds, which will be divided among the present stockholders pro rata.

The new suit to turn the property over to a receiver threatens to upset the reorganization scheme and involve the property in long litigation. The mine is one of the largest producers of copper in the United States.

Rich deposits of tin have been discovered in Queensland, Australia. Developments by hand labor make it almost a matter of absolute certainty that the lead struck extends for some miles, and that where it breaks off, isolated masses of ore are in fair abundance.

## DIFFERENCE IN MAGNETIC NEEDLES.

BY C. LOUIS BERGER.

Why do different magnetic needles not always point in the same direction, though observed at the same place and time?

A close observer of the compasses used in surveying instruments must have noticed that the exterior shape of the magnetic needles, forming part thereof, frequently differs as much as do the styles of the instruments themselves. In some cases the needle consists of a bar of thin steel, oblong in shape, which rests flatwise on its supporting pin, so that its greatest superficial area lies in the horizontal plane as shown in Fig. 1. In others, as represented in Figs. 2, 3 and 4, the shapes are modifications of the above in a greater or less degree, inasmuch as their longer transverse dimensions—whether at the ends or center—also lie in the horizontal direction. Some magnetic needles carry a graduated circle or verniers, as the case may be, as seen in Figs. 5 and 6, whose zero points are supposed to lie in the geometrical axis of the needle; some are placed edgewise, so that the greatest superficial area lies in the vertical plane. There are also dipping needles to measure the intensity of the earth's magnetism; short and stubby needles with aluminum extensions for galvanometers; complex needles, made in sections, used in marine compasses, and cylindrical or tubular forms used in scientific research. (Needles of the last mentioned type are not read by observing the ends, but by means of mirrors attached at the middle similar to those on a magnetometer.) Figs. 9, 10 and 11 show the principal types of the last mentioned needles.\*

Since these latter forms are never met with in surveying instruments, we shall not consider them here, except to show the different styles of needles in vogue—suffice it to say that some of the shapes are simply selected by their propounders for the larger superficial area which they have, compared with others, according to the purposes for which they are intended; for it is well known that the larger

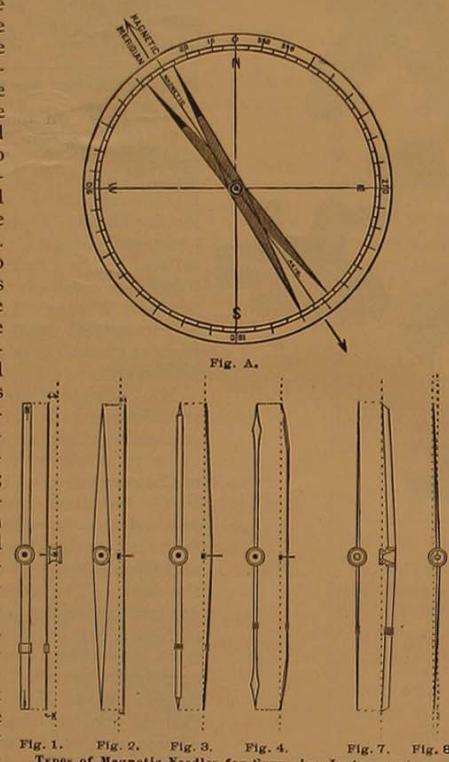
the superficial area, combined with a minimum weight, the more delicate will the magnetic needle be; thus, a needle made of very thin steel tube will be capable of receiving and retaining a greater charge of magnetic force, and also being very light—preventing wear of the cap and pin—it is easily influenced to assume the direction of the magnetic meridian in azimuth.

However, we wish to remark here that it is not so important that the needle of a surveying instrument should have a great magnetic intensity up or nearly to saturation—which it may receive according to its superficial area and degree of hardness—as it is that it should have as constant an amount as possible, be it great or small. Of course such a needle should not have a surcharge, which it is apt to receive if improperly hardened, because its intensity is liable to be diminished and the needle thrown out of balance thereby, from time to time requiring a readjustment of its counterpoise for the same latitude in which it

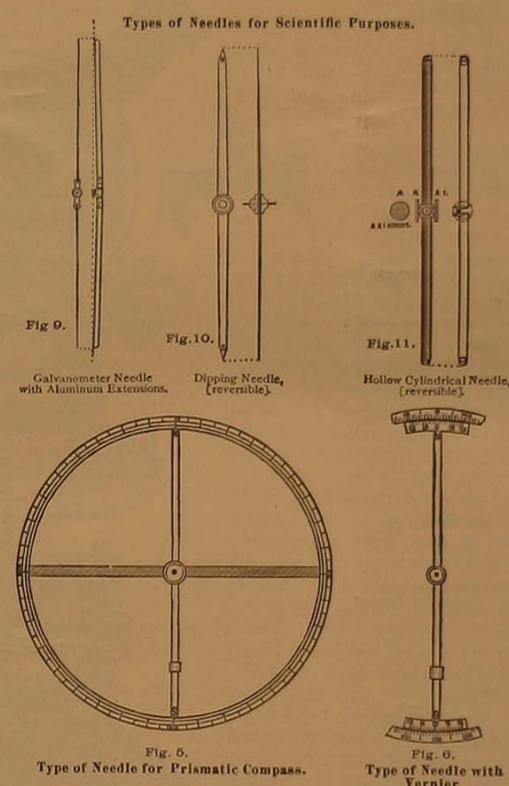
remains therefore, for us to show in how far the exterior shape of a needle—whether of a faulty design or imperfect construction—may affect its reading, inasmuch as its geometrical axis, that is, the line passing through its ends and the center point in the needle cap may not coincide with its magnetic axis, which lies in the plane passing vertically through its poles and in which the magnetic meridian is contained.

However, to get a complete understanding of the matter, we must go back to the ingot from which the steel of the needle was produced. If we remove a portion of the outer crust of a steel ingot or other casting and carefully examine the surface laid bare with a magnifying glass, we shall find that what seemed to the naked eye as a solid mass is now a spongy one, with numberless small and large cavities or blow holes. It is only by forging and rolling into bars and sheets, at the mill, that the metal becomes at all homogeneous. Some of the cavities not being

welded, are elongated in the direction of the rolling, and form veins, flaws or blisters according to size, thus imparting to the bar or the a structural grain or fibre, which, while always traceable in poor steel, can only be detected in degree when the ingot has been converted into fine steel. In the absence of information to the contrary it is therefore but natural for the writer to believe that when a needle is being magnetized its resulting magnetic axis will in all likelihood tend to run in the direction of the general trend



Types of Magnetic Needles for Surveying Instruments.



Type of Needle for Prismatic Compass.

Type of Needle with Vernier.

is used. It is all-essential that a well constituted needle should have a proper symmetrical form as regards the longitudinal axis, and that it should be supported on a pivot as free from friction as it is possible for human ingenuity and skill to contrive. Besides the necessity of proper form and suspension, the quality and degree of hardness of the steel, length of the needle, and lastly the strength of its magnetic force, whether imparted by an auxiliary magnet or more powerful electric battery and coil, have a most important influence on the behavior of a needle.

Returning to Fig. 1 we see exemplified the flat bar, and in Fig. 7 the edge bar needle as used in surveyors' compasses, but as all the intermediate styles of needles are simply modifications of the flat oblong form in order to be light in weight, partaking of the same principle that is involved, we shall consider these two forms almost exclusively. It

of this grain without strict regard to the geometrical axis, with which it may then be at an angle. The above divergence of these two axes may, therefore, be considered as one cause of the observed fact—that two needles, though of the same size and shape, other things being equal, may not read exactly the same when observed at the same place and time.

If, on the other hand, these two axes (magnetic and geometrical) do coincide, there will be no deviation, and two or any number of needles will read alike under the conditions above mentioned, if tested in the same compass.

Notwithstanding the fact that it is, in practice, very difficult to attain the desired result, on account of the difficulty of tracing the grain, the writer would and does insist that the steel used in the construction of needles for surveying instruments shall not be forged, but shall be cut from fine shear steel, in the

\*The largest and most delicate magnetic needle with which the writer is acquainted is that of the large magnetometer in the University of Marburg, made of a solid bar of steel two feet long and weighing about twenty-five pounds. It was suspended from the ceiling by a strand of silk fibres, and was provided with a graduated circle of 360 degrees, which could easily be read by the use of a scale and theodolite. A similar instrument was made after the style of the Gauss instruments and with it many observations were made to determine the diurnal and annual changes in the magnetic meridian at that place during the younger days of the writer.

direction in which it was rolled, and be treated in such a manner as to ensure as near a parallelism of the structural grain with the geometrical axis as possible. Yet in spite of the utmost care and skill consequent minor magnetic poles are probably present, and there is almost certain to be a deviation of these two axes, and this deviation will vary in magnitude with the quality of the material and the grain, the design, width and length of the needle, and the mechanical skill with which its outlines in azimuth have been made, as also with the degree of accuracy with which the point of suspension has been located in the geometrical axis.

While it may seem that just here the instrument maker's real work should begin in the testing and adjusting of these axes by grinding off a little from one side or the other, as the case may be, to insure a coincidence of the two axes, he, as a rule, will stop here, either from lack of understanding or from want of necessary apparatus and a secluded space free from iron and provided with well defined meridian marks established by means of collimators or natural objects.

His chief reason for not doing this, however, may be said to be the fact that neither he nor the surveyor wish to bear the added expense.

For this and other reasons the scientist, not wishing to depend upon mechanical skill for good results, adopts the method of reversion, by means of which errors from this source can be entirely eliminated.

Therefore, the needle used in his investigations (See Fig. A) can be reversed by simply turning the needle upside down (the cap having been changed from the top to the bottom side of the needle) on the center bearing point, so that he can use the mean of the readings of each end in both the direct and reverse position as the result sought.

If the surveyor is desirous of making some such test, he can do so readily, not by changing the center cap as above noted, for he cannot do so with American instruments, as the center cap is firmly fixed to the needle, but by first taking a careful reading of both ends of the needle, he can, by means of a strong magnet reverse the poles of the needle,\* and after rebalancing, read again the two ends, thus obtaining a reading correct in a measure, and approximately finding the constant of his needle, which he can use when needed for important work.

The constant of the needle is, therefore, *the angle that the magnetic axis makes with the geometrical axis*.

If a needle has aluminum extension arms, as in galvanometers Fig. 9, or a circle attached as in the case of prismatic compasses, Fig. 5, or if it is provided with verniers as in some compasses, Fig. 6, then the constant of the needle or the index error is the angle that the zeros of the graduations or extensions (supposed to be in coincidence with the geometric axis) makes with the magnetic axis. As a rule, needles of the latter type always do have such an index error in addition to those arising from eccentricity of graduation and the difficulty encountered by the maker to determine the magnetic axis.

While the methods of reversion for eliminating errors of eccentricity and non-coincidence of the principal axes just described are good for scientific research, they are ill adapted for the work of the surveyor.

(To be Continued)

\*Accidental charging of the poles by carrying the instrument on an electric car near the motor has been noticed by the writer, and has explained what, at first, seemed to be very queer behavior on the part of the needle.

## COLD EXPANSION OF METALS.\*

### A California Engineer's Remarkable Observations in Siberia.

The singular metallic phenomenon observed by Lodian on the great Siberian railroad—Steel rails expanding under intense cold.

BY L. LODIAN, C. E., SAN FRANCISCO.

(All Rights Reserved.)

In the private report on the Lodian inspection of the military and strategic features of the great trans-Ciberian & Russian railroad systems (*Report secret de l'inspection Lodian des failles militaires & stratégiques du chemin-de-fer trans-Ciberian & des voies-ferrées russes—1896 97-98 [Paris; 1898]*), there are naturally many notes which merit being saved from the oblivion of official & state archives & cabinet pigeon-holes—particularly as no copies of the report were issued to the public, nor are any now obtainable either officially or privately.

One of the most curious observations therein is in reality a phenomenon & relates to the expansion of steel rails under long-continued, excessiv dry cold. Entirely rewriting and developing this particular exhibit, the following has to be said.

Frequently during the intense cold of the months of December, January, and February, I observed the rails so jammed up against each other by expansion, that the ends were begining to work up, but were kept down by being jammed down by the passing cars. For length after length, versta after versta, the expansion was such that a pin could not be thrust anywhere between the rail-ends. The rails were light—only 18 pounds per foot—, Russian-made (according to inscription); but I never troubled at the time to inquire of the division-engineers for an analisis of the metal, or for samples,—altho just here I know the data would be interesting. Now, at this distance, to even get a 'pocket' sample would, with express charges, cost \$50,—so costly does any special requirement suddenly become so soon as it touches "une affaire de faine". Most engineers know this—to their cost.

[a contribution to science, & its labor]

The present paper has been prepared exclusively for publication, & has not been read before any society, or given any prior publicity which might detract from its value as an original contribution. To give an idea of the amount of time involved in the production of a studied paper like this, I may state that the work on it has lasted from the winter of '96 97,—since I have only been able to touch it at intervals as time and inclination permitted. The first ruf notes were made on the spot in Cibiria: for I decided there and then to communicate the fenomenon some day to science in a special paper distinct from my private reports (which, by the way, never see the light of print).

Working on the paper thus piecemeal,—the tipewritten copy appearing on different-size slips,—as happend handiest,—will explain the rather disconnected nature of the paragraphs—which, however, for easier reference, have mostly been placed under small-capital cross-heads.

\*While Mr. Lodian is an American born citizen, he has spent most of his time in France and the frozen lands of Russia-Siberia.

The notes herewith are printed as they appeared in his copy, not having been edited, or changed in any way, except where reference was made to politics, which was omitted, as it did not have any bearing on the subject.—ASSOCIATE EDITOR.

[the name Cibiria]

Thruout this paper, I have spelt Cibiria the only correct way, which is the Russian way (Cibipia, pronounced Cibiria; formerly Cibip, pron. Cibir). All other ways ar wrong. The improper "Siberia" is a copy of the French ignorant corruption "Siberie". The gaulois corrupt everything from names to jews I kno it requires an enormous amount of moral courage to spel a word properly. The original call for the Lodian controling inspection, stipulated for the conservation of the strict purity of geographic names as locally spelt. In this respect alone, the report ranks as a model of geographic accuracy.

[negociatory]

It is true—I might as well at once say—that during the moderat—for Cibiria—cold, say down to 25—40 below zero centigrado (at 40° below, centigrado and fahrenheit are just equal), the usual rail-contractions were noticed here as in any other country during winter, but of course being far more pronounced in this subarctic region. I have sometimes seen such a contraction as to leave 2½ centimeters between rail-ends—almost an inch.

[the cold-expansion fenomenon]

But, beyond 40 below zero, under certain conditions, steel rails begin to behave differently. They expand! The fact is incontrovertible,—since various Russian engineers in Cibiria, placed in possession of the singular feature by myself, have taken cognizance of it; but for any of them to report the matter to headquarters at Peterburg would be considered an "act of presumption", because "unknown to science", and might lead to the engineer reporting, being still further sent the Ciprian way—I mean the Cibiran way,—, so the engineers diplomatically "hold their tungs".

Just why this expansion occurs under excessiv cold-spells—for there must be a reason for it—is one of those problems which by no means known to me can be explained at present. It is a problem which means and requires, to be answered thoroly, an efficient laboratory and costly instruments of precision and diverse machinery, for observation on the spot thru several successiv winter-months.

[deduction]

The deduction to be derived from the above observations is this: That certain compositions of iron and steel act, under protracted intense cold the same as water acts. The particles or molecules of water, as is well known, contract down to zero; then beyond that, begin to expand, and, in the form of ice, to float. Certain metals contract, I should say, down to 35 below zero centigrado,—varying according to the constitution of the molecules;—then under a long succession of intensely cold dry days at from 35 to 50 below, to expand in almost the same ratio as during summer weather at from 30 to 40 degrees centigrado above.

[“theory” versus practice]

But diploma-theorists and college-professors can argue as they like as to whether steel rails expand under abnormal conditions of natural cold. I would advise the more skeptical of them to take a little walk of, say, 2000 miles over the great Cibiran railroad during December, Janmary and February to find out for themselves. They could then make cool calcylations ad libitum!

As a practician myself, I never had much respect for "theorists". It was "theorists"

—“engineering” and otherwise—who declared Suez canal could never be built; that a steamer could never cross the ocean; that a trans-American railroad was “impossible” (there are 7 in operation today); while other notorious “impossibilities”—to “theorists”—might be quoted ad nauseum.

“Practice disposes what theory proposes” is simply another rendering of an old proverb—Theory proposes; Practice disposes. ‘All things are right’—or wrong—in theory. The proverbial ‘99’ turn out wrong in practice. But it is just on the odd 1 per cent that theorists get left.

This phenomenon will be doubted, I know—like a good many other things I have to say about Cibiria (improperly “Siberia”) and its climate. But, ther—I saw the singularity again & again, over thousands of miles, with my own eyes, and I believe I am the first person to notice this peculiar behavior of steel rails, and am glad to contribute the item to the history of metals. Even Russian engineers themselves—of the very divisions on the central Cibiran and western Cibiran stretches where the expansions were most marked—were unaware of this fact until I took them the news. And I can easily understand why they had never found it out for themselves,—for during my thru-winter 3000-mile survey of the Cibiran railroad—constructed and constructing—(Oct. '86—April '97) over the snow-ice from the Baikal and Altai regions to the Ural mountains, I never once met a single engineer out inspecting the line. It was too cool for them!

[the greatest long-distance survey on record]

Since the subject is interesting, a brief sketch of the remarkable survey during which phenomena were observed,—of which this cold-expansion theory is but one,—will probably be appreciated. It will prove at least that the suggested new ‘lex Lodian’ in metallics has been based upon the most prolonged personal observations on the spot.

The trans-Cibiran trans-European inspection and survey of the Lodian commission was privately commenced at Bladivostok (pronounced Vladivostok—*c* soft), on the Pacific ocean (nacifk-okean), the 18 (30) April '96; proceeded north to Kabarovsk (pron. Kabarovsk) on the Amur; then skirted the Amur & connexions, along the Manchuria frontier; for 2000 verstas; crossed the Iabloni range on the confines of eastern Cibiria; the trans-Baikal region; the Altai ciepa (pron. ciera),—the ciera-nevada of central Cibiria and Mongolia;—covered the circum-Baikal strategic route; and gained Ipytck (pron. Irkutck, —*c* always soft) the 20 August (1 Sept.).

Two months’ delay occurred at this dirty big village in the heart of Cibiria, (styled the ‘capital’ thereof), awaiting instructions; and the 16 (25) Oct. the unique thru-winter surveying detail was commenced. (The winter had set in nearly a month previous.) It is believed to be the first and only instance on record in the history of surveying of a topographic detail planned on an all-winter 3000-mile scale of magnitude over the Cibirian snows.

[where the cold-expansion discovery was made]

From Ipytck, the line of operations of the Lodian detail lay over the central Cibiran ciepa; deviated thru the Tomck region,—surveying (January '97) thru 52° below centigrado (58° below f.), the maximum cold recorded during the circuitous 8000-mile overland survey between the Pacific ocean & Polska (Poland). Followed the tryingly-

severe surveys thru the icy-blasts of the great Kirgisi 2000-verstas-across cten (pron. step) of Western Cibiria; and finally the historic Acia-Ebpona (Asia-Europa) monument in the heart of the Urals was passed on the central route beyond Cipotck (pron. Cirotan) the 18 (30) April '97.

This ended the trans-Asiatic detail.

[strategising Russian railroads]

Here, the trans-European survey was commenced, & continued over the Ural divide circuitously across Poccia (Russia), via Camapa (pron. Camara) and Tyla—near which town occurred the pre-arranged Tolstoi-Lodian meeting,—perhaps the most *distingue* European-American individual meeting since the Kossuth-Lodian conference at Torino in June '92.

Now the tangent-surveys went north to Mockba (pron. Mockfa), where arrangements were made for a second thru-winter surveying campaign thru northern Russia. This was duly effected to the capital, Peterburg; thence south-west via Dniick (pron. Dfinck) to Warszawa; and from the Polska capital to the old Polish town of Posnan, where the surveys were definitely concluded the 22nd Feb. (16 March) '98,—the self-same original Lodian trans-Asiatic trans-European survey going out of commission here.

Official report: no incident (the entire thru-route and strategic inspection being accomplished without hindrance or a single mishap.)

Total distance inspected and surveyed, including detours, 12,900 verstas (pronounced verstas), or exceeding 1300 decimal leagues (1 decimal leag = 6 1/4 miles), or over 8,000 miles. Time: 676 days,—thru two summers & two winters,—of which 266 interspersed “in” days,—(noting, resting, off-visits, &c.)

[8000 miles of tangent-surveying afoot]

As the detailed nature of this now historic survey and inspection called for constant traveling afoot, it is calculated that—on and off—fully 8000 miles were covered on foot,—an average for the whole period on commission, turning a dozen miles per diem, or say half a mile an hour all thru,—an apparently most insignificant ‘speed’.

But of course the most remarkable thing about the leisurely-accomplished Lodian tangent survey was its 8000-mile magnitude, of which 4000 miles afoot over the winter snows alone of Cibiria and Russia.

[abnormal cold-expansion on the trans-Baikal]

This expansion of rails under protracted cold weather may prove a source of danger on the Baikal and trans Baikal stretches, where the cold is intenser and dryer and lasts longer than in Western Cibiria. But I cannot write with the same precision on the trans-Baikal lines as I do on the central & western Cibiran sections, since all the trans-Baikal and Pacific-ocean divisions of the constructing railroad comprised in the Lodian inspection, were examined during the spring & summer of '96, including the trans-Altai circum-Baikal strategic routes.

[cold-expansion derailment a possibility]

It may result that the Russian engineers will one day discover they have neglected to reckon with this glacial rail-expansion. Simply because, like other engineers, they are mostly ignorant of this minor phenomenon. For a thousand miles on the Altai side of the Baikal, the intense cold is almost continuous night & day for four or five months. This may, during the glacial spells of January & February, be enough to at times send the rails

on the creep to a dangerous extent. There may be repeated derailments during the arctic season, & it will puzzle the division-engineers—ignorant of the cause—to account for them. And, the engineer’s house being maybe 70 to 100 verstas from the spot, and not caring himself to face the glacial blasts on *drizina* (inspection trolley) or afoot to make a minute inspection, he is not likely to easily find out. Then a special, gorgeously-uniformed commission, with little toy swords, will be sent from Peterburg 4000 miles to investigate. This will cost about 10,000 pycle (pronounced rubls).

[cold-expansion, like heat-expansion, not consistent]

The cold-expansions were not consistent, however, as noted during daily observations extending across 4000 verstas of territory under the snow-ice. In many widely-separated localities, some rails apparently showed neither contraction or expansion from the normal under 40°—50° belo centigrado; and I concluded these had already undergone contraction then had expanded to the limit permitted by the constitution of the molecules, which lent the rails an apparently normal appearance—as I saw them. How otherwise could their seemingly normal status be accounted for in 40°—52° below zero centigrado (40°—58° fahr.)?

[comparing notes]

Should any reader of these remarks have noticed or heard of similar phenomena, I should be glad to compare notes. While I am traveling just now, I have permanent addresses at San-Francisko (Kalifornia), & in Europe at Paris (avenue de l’opera 21). My present traveling postal address is 12 g. d., Manhattan, New-York.

[natural cold & artificial cold: the difference]

Now, to anticipate having the “liquid air” argument brought into play, as antagonistic to this cold-expansion idea, permit me to point out the difference between artificial liquid air cold and the natural desiccated Cibiran winter. Liquid air means moisture,—air liquified by *artificial* cold. Where moisture is present, there will never be any cold-expansion,—might just as well expect certain fases of electricity out of damp. Nor—being an artificial cold—would liquid-air cold avail for the experimental production of cold-expansion.

[cause & effect: an idea of the Cibiran cold that causes the expansion]

The extreme purity of the winter air in Cibiria will one day render it famous as a health resort. (The Russian government have for many years recognised its efficiency as a health resort—for political patients.) The Cibiran winter cold is of a dryness incomparable. Even the latent “moisture”—or whatever it can be termed—in the air during the superb sunny days of midwinter, is only manifest by its being seen floating in the air, during the days of intensest cold, in the form of minutest ice-cristals. By latent moisture, I mean a moisture so imperceptible, that no instrument of precision known to science is capable of registering it. Nature’s unique cold here freezes everything—even unto the latent moisture; and under these circumstances, certain compositions of metals will expand.

[lex Lodian (law Lodian).—Shall it be called the Lodian law?]

To prevent misrepresentation by technical—and other dictionary—compilers, I will sin-

opposite the whole matter under the caption 'law Lodian',—since I am, I believe, the first person to notice the phenomenon; and respectfully submit the proposition to the scientific societies of the globe for investigation:

Lodian law, in *metallurgy*, the law (the subject of current inquiry) that certain compositions of metals are liable to expansion under prolonged periods of intense, dry, natural cold, from  $35^{\circ}$ — $50^{\circ}$  below centigrado. [First noted by L. Lodian, an American engineer, during the Lodian thru-inspection of the great trans-Cibrian railroad, winter '96-'97]

[summing-up]

To sum up, I can only confirm my previous opinion—

1st—That iron and steel of certain compositions are liable to expansion under conditions of protracted intense dry cold.

2nd—The local causes are open for complete investigation—which investigation, however, is never likely to be made, since it would cost some five thousand dollars to depute a properly-equip'd specialist to the spot to watch the phenomena thru a Cibrian winter.

San Francisko.

L. LODIAN.

#### MINERAL RESOURCES OF SIBERIA.\*

(BY N. J. STONE.)

Siberia's mineral wealth is a matter of great importance. The well known French economist, M. Leroy Beaulieu, in concluding his letters from Siberia, a few months ago, expressed the opinion that Siberia is not ripe for developing manufactures, but needs only foreign capital and foreign skill to bring out the enormous mineral wealth that lies hidden in its bowels. And here he struck the keynote of the situation. Let us try to get a glimpse of Siberia as she appears to the eye of the geographer and mineralogist, before we draw our own conclusions.

According to Russian geographies, Siberia may be divided into three principal zones:

- (1.) The agricultural zone.
- (2.) The forest zone.
- (3.) Polar, or northern zone.

The following brief table, taken from the Statistical Almanac, *The Whole Russia*, gives an idea of their relative importance:

ZONE.	AREA, SQUARE MILES.	PER CENT.	POPULATION.
Agricultural,	1,366,151	25	5,500,000
Forest.....	2,326,539	43	845,000
Polar .....	1,728,896	32	75,000
Total.....	5,421,586	100	6,420,000

What makes a particularly cold country less adapted for agriculture than regions of European Russia, situated at a corresponding latitude, is the conformation of its surface. A vast endless plain, with the highest mountains in the world situated at its southern borders, and thus effectually cutting her off from the influence of the milder climate of the south, she lies open to the northern winds of the Arctic Ocean.

The figures given above for the area of the agricultural zone, (which is more than twice that given by Dr. Ballod) are based on the assumption that the lowest average yearly temperature, compatible with agriculture, is slightly above  $57^{\circ}$  F. If we were to draw a line on a map denoting the limits of that zone, we would get a sloping line beginning at the extreme western end of Siberia, at about  $60^{\circ}$  north latitude, sloping southward on its way East, cutting through Lake Bai-

kal in its northern part, and coinciding with the parallel  $50^{\circ}$  north latitude at the extreme east. This zone, in its western part, may be subdivided into two parts, the southern, which is hilly, and the northern, consisting of steppes. The former, protected from the north by a chain of high mountains, has a mild climate, in fact, one of the finest in the Russian Empire, allowing not only of the growing of cereals and vegetables, but even that of fruits, grapes not excepted.

The northern level country is very arid, and, in consequence, suffers from extremes of heat and cold; still, its colds are not as severe as in the rest of Siberia. Besides raising all sorts of cereals, from wheat to oats, it has many other resources for the population to fall back upon. Its fisheries alone might furnish employment to many more thousands of people than they do now, but for lack of capital. The rarest and choicest of fish, such as make up the delicacies of the most exacting gastronomer, are caught here in abundance, and the export trade which has now become so easy, owing to the Trans-Caspian Railway, and which amounts to thousands of poods\* at present, needs yet to be properly organized.

The white steppes of the Semipalatinsk territory, a region only slightly less in area than France, overflow with an abundance of cattle, grazing being the chief occupation of the nomadic tribes wandering here, and offer exceptional opportunities for soap and leather manufacture, which is just now in its infancy. And, though the forest zone justly lays claim to the fame of being the richest part of Siberia, it is by no means the only one that can boast of great mineral wealth. Rich deposits of gold, silver and minerals are found in the various parts of Siberia which make up the agricultural zone. In the territory of Semipalatinsk alone are found thirty gold mines, besides rich deposits of silver, lead, coal and graphite, all of which are now being extracted, and give good profits, in spite of the primitive means employed in the work.

The same may be said of the province of Amoor, where gold mining is assuming the leading place in the industries of that region, both by value of its output and the number of workmen employed. In twenty-three years this region has produced from 1,277,473,772 poods, or 25,549,475½ tons of gravel washed, 6,040 poods equal to about 3,520,000 Troy ounces of gold, or say \$70,400,000, an average of \$3,060,869 per year.

Gold is obtained here almost exclusively by placer mining, while the extraction of gold from mineral ore has hardly been begun. The good profits the Amoor fields are yielding are still more surprising when to the primitive methods of working are added comparatively high wages, from five or six hundred rubles per year, besides board. (The value of a ruble is equal to  $51\frac{1}{2}$  cents; but its purchasing power in Russia is nearly equal to that of a dollar in the United States.) Still the chief occupation in that province is agriculture. Spring corn, wheat, oats, barley and buckwheat are raised; the local product is, however, insufficient for the needs of the population, and grain has to be imported to a considerable extent.

The mountainous part of the government of Tomsk is one of the richest in the empire in mineral wealth. Mining was started here as early as 1726, by the famous Prince Demidoff. The best paying mines are those extracting gold, silver, lead and iron, the latter

especially in the Altai and Salair Mountains. The Altai Mountains are rich in quarries of stone. In the District of Biysk more than five hundred different kinds of colored stone are obtained, besides a great variety of building material, such as granite, porphyry, sandstone, limestone, and also salt. In the district, lying within less than 75 miles from Tomsk, an immense coal field has been lately discovered, which, it is asserted, will furnish a product exceeding in quality the best English kind. There are even two springs of hot mineral water in that neighborhood. Agriculture furnishes occupation to fifteen thousand men. Fishing also occupies a prominent place.

The forest zone, which contains such a small fraction of the population of Siberia, is in reality the richest and most important part, in fact, the one that is destined to prove the point of attraction for foreign and home capital, and therefore to play that commanding part in economic and political life of a young country which the East has been playing in the United States. Being situated to the north of the agricultural zone, it is remarked for its more severe climate. Its northern limits being where the soil is continually in a frozen state. Thus, in the town of Berezoff, situated in this zone, only the upper layer of the soil is not frozen during the brief summers, but at a depth of  $2\frac{1}{2}$  feet, the ground is constantly in a frozen state. This is, however, true only of its northern part; as it approaches the south, conditions change for the better. Though smaller in population, it is greater than the agricultural zone in extent. Its mineral wealth is inexhaustible. Mining has been carried on here for the last two centuries. The metals extracted are chiefly gold, silver, mercury, tin, lead, copper and iron; turf, hard coal, graphite, sulphur and naptha are also mined, besides two kinds of salt—the ordinary table salt and the medical Glauber's salt.

As we shall see, when reviewing the resources of some of the provinces in that region, rich finds of precious stones are not infrequent. This is perfectly natural when we recall the fact that Siberia was once a tropical country, covered with the richest forests, a country with a nature in no way second to that of Brazil. Finds of skeletons of mastodons and other primitive animals naturally suggest the probable presence of rich coal fields, as well as of precious stones, both of which are now in great evidence. The exploitation of diamond fields may in time become here as important an industry as in Brazil or South Africa.

Passing now to some of the provinces in that zone, we may mention the Transbaikalian Province, with an area exceeding that of France. Here, besides gold, silver, lead, iron, tin and copper mines are also found and obtained mercury and the following precious stones: amethyst, jasper, carnelian, agate, opals, topaz, etc. Besides these, the province is rich in mineral waters, boiling springs being met with in many places. The flora and fauna are very rich and of great variety. In the part of Amoor Province belonging to the forest zone, silver and lead, copper and iron are in abundance. In the tributaries of the Selimia River, pearl has been discovered in quantities to promise a new valuable industry. Here, as in the other provinces, are to be found ferruginous springs. The flora is luxuriant and differs from that of Continental Asia. The forests are in many parts impassable, presenting a solid phalanx of century-old cedars, and pines 100 feet high, swarming

\* From the Monthly Summary of Commerce and Finance of the United States.

\*A pood is equal to 40 pounds avoirdupois.

with animals of the most widely different kinds, from deer to tiger.

The Island of Sakhalin is known for the rich coal fields, which are worked at present only under contracts for the government, which uses the coal for its fleet on the Pacific. With the development of commerce, this large island will no doubt become an important factor in the Orient. The same is true of the Peninsula of Kamchatka, which, though situated far to the north, is rich in virgin copper, virgin sulphur, magnetic ore, coal, amber and mica.

And, finally, that dreadful Yakutsk Province, which has so much to offset the disadvantages of its severe colds. This province, twice the size of the countries of France, Austria-Hungary, and Germany combined, equal to eight-tenths the area of European Russia, with a density of population amounting to one person for each 6 1/10th square miles, has no lack of mineral wealth. The Stanovoi Mountains, stretching along its eastern boundary, from south to north contain rich ores of silver and lead. Iron and coal are found throughout the province. But the only industry developed here is that of placer mining, especially along the Lena River, which is rich in gold fields.

#### MEXICAN ONYX.\*

The stone to which the name "Onyx," or, more properly, "Onyx Marble" is applied, differs from the marble of the common type in being a purely chemical deposit, rather than resulting from the metamorphism of calcareous sediments from the floor of caves, or a travertine. All the finer grades of onyx in this country, so far as now known, are travertine, that is to say, spring deposits. They have resulted from the leaching out, by carbonated waters, of the lime constituents of pre-existing rocks, and the subsequent deposition of this lime, as carbonate, upon the surface of the ground, when the water evaporated or lost its excess of carbonic acid.

Found in this way it is not difficult to understand that the beds are far less extensive and regular in their arrangement than are the ordinary stratified limestones and marbles. Spring action is more or less intermittent, and the place of discharge, as well as the character of the deposit, is variable. The latter usually takes the form of a comparatively thin crust, conforming to the contours of the surface on which it lies, though sometimes it is in vein-like and irregular nodular masses. The various layers thicken and thin out irregularly, and are often lenticular in cross sections. Layers of uniformly sound material, of more than 20 inches thickness, are not common. Where two or more layers occur, they are as a rule separated by intervening layers of tufaceous matter, or by foreign debris. Both color and textual qualities of the stone are liable to abrupt changes, and not unfrequently the character of the output are so uncertain that it is impossible to make contracts for blocks of any specified size and color in advance of actual quarrying.

A marked and very beautiful feature of the stone is the fine wavy banding shown upon a cross section, which is of course due to the mode of origin through successive depositions upon the surface. The stone owes its value for decorative purposes to its translucency, fine veination and color. In many instances the original hues have been enhanced by

oxidation, and through the development of reticulating veins of small size, due to incipient fracture into which percolating waters have introduced new coloring solutions or locally oxidized the iron carbonate, which seems to form the chief coloring constituent. Mineralogically, it should be stated, the onyx marbles consist almost exclusively of calcite and not aragonite, as has been commonly supposed. Their average hardness is about 3.5, Dana's scale, which is a trifle greater than that of ordinary calcite, though not harder than many compact marbles.

A workable deposit of this onyx is situated at Meyer's Station, 25 or 30 miles southeast of Prescott, in Arizona. This occurs in a country of crystalline schists and older eruptives, and is well exposed at the stage station on the banks of Big Bug Creek. The stone occurs as a surface deposit, and interbedded with a coarse breccia, formed of schistose and dioritic fragments, embedded in a sandy and calcareous matrix, the entire foundation occupying a series of low hills or rounded knolls, of which an area of 200 acres is estimated to comprise all the quarriable material. At the shallow openings that have been made, the onyx occurs in irregular, somewhat concentric layers, from the fraction of an inch to two feet or more in thickness. These were in a few instances quite uniformly green in color throughout, but as a rule, were traversed parallel with the plane of deposition by wavy bands of color in all shades of amber, white, ochre yellow, brown, and deep ochreous red. The sound layers of stone were as a rule separated from each other by porous cellular layers, so that slabs of large size were obtainable only by cutting parallel with the plane of deposition. The more highly-colored varieties carry, as shown by analysis, some five per cent of carbonate of iron.

So far as has been determined by the surface exposures, there are here three beds of the onyx alternating with the breccia above noted.

Mexican onyx, though closely resembling true onyx, is more of a variety of sulphate of lime, such as crystallized gypsum or alabaster colored by the presence of iron or other metallic substances.

True onyx is a kind of agate, or properly classed under the chalcedonic varieties of silica, and is used in making jewellery. The cameo is onyx. The surface having been engraved through leaving the white under-streak, showing through a back ground of brown or black. Again, the raised portions of the cameo, which stand out in bas-relief, are of another color, composed of the next layer or vein of the stone.

#### CORRESPONDENCE

##### ARIZONA.

(From Our Special Correspondent.)

CHLORIDE, Arizona, Dec. 10, 1899.

EDITOR JOURNAL:—Fair weather and big and new outputs of ore from all the mines is causing quite an unprecedented state of activity in all circles in this city and surrounding camps and districts. The largest, richest and most permanent body of ore, however, is in the Tennessee Mine, whose large body of ore the past summer and fall created great wonderment, but is now fabulous and phenomenal. The main shaft is down about 400 feet, with ore on all sides, top and bottom.

The mill is putting through 200 tons of ore each day and night, and two cars will not carry the concentrates to market daily. The number of men employed is by great odds larger than ever before, and more machinery is constantly being added to the mill as well as in improvements in buildings, tramways and hoisting apparatus. A. M. Botsford of Los Angeles succeeded E. T. Loy as manager in the Tennessee Mine on the 1st inst., and is now regularly installed in his new work and getting acquainted with its needs and necessities. Mr. Loy has been given entire charge of the Juno Mine and is already directing the work of a new plant of hoisting works. With the Juno, it is believed, Mr. Loy will make of it what he has made of the Tennessee.

Work upon the Schuylkill Mine is to begin immediately, and not only employment to a large number of miners will be given, but a new steam hoist and 100-ton concentrating plant is also at once to be instituted. The Schuylkill lies directly between the Tennessee and Elkhart mines, and is joined at either end by both of them. The mine belongs to F. M. Theis, and is known to contain as large and rich an ore body as either of its annexes, but the long drawback to its working has been caused by a pending suit of something like a quarter of a million dollars. But this being off, Mr. Theis has nothing to do but begin the operation of taking down its great ledges of ore and putting it through the concentrator and sending the residue to market.

The Lucky Boy Mine is shipping three carloads of \$1.50 silver ore a week. The tunnel from which the greater part of the ore is being taken is in eighty feet, and driving straight ahead for the summit of the Cerbat Range. A new tunnel, 300 feet below the present one is being started to cut the ledge under the present one. John Smithline, former owner of the mine, and who sold it for a good round sum of money only a few months ago, is foreman and manager, who is the best man of all others to occupy the position. The new owners are well pleased with the purchase, and have heartily entered into its development and improvements.

The Watchman Bros., Thomas & Peter, leasing on the north end of the Distaff Mine, have struck a good sized body of high grade shipping ore. In the old workings, at the south end of the Distaff, Chas. Sherman is taking out shipments of ore from a larger body.

The Merrimac concentrator will be in place and ready for work by Christmas, and a large amount of ore awaits its completion.

#### MEXICO.

TEPIC, Nov. 20, '99.

EDITOR JOURNAL: M. B. King, M. E., Consulting Engineer for the Valenceana Silver Mining Co., Catarina Silver Mining Co., La Barga Gold Mining & Milling Co., the San Bartolo Gold Mining Co. of Tepic, left for San Francisco on Nov. 23rd, to arrange for the purchasing of the new machinery to be placed in the mines by these Companies. Mr. King will also place a few mines on the market, either for cash or an interest in them for putting in the necessary machinery to handle the ores. He will form a company to work some very extensive copper properties and a quicksilver mine. The mines in and around Tepic are very active, and a large amount of money is being spent on machinery and development work.

\* Extracts of an article in the Mineral Industry, by George P. Merrill, and from other sources.

Lic Elias Galindo expects soon to have his mines in first class shape to commence running the new mill before the next rainy season. These mines are among the richest of the Totepuzeo District, also, in the Acutepulco District.

The San Bartolo Mines will soon start a new tunnel to tap the vein at 800 meters deep. This tunnel will be 296 meters long, of regulation size.

Many denunciations are being daily made near Qxtlan and Pijinto.

Large iron ore deposits were discovered on the Hacienda Havarite, 15 miles from Port San Blas, if the ore will warrant, shipments to San Francisco will soon be made. TEPIC.

## UTAH.

(From our Special Correspondent.)

SALT LAKE CITY, UTAH, Dec. 9, 1899.

EDITOR JOURNAL:—The mining stock market this week had a more healthy condition, although some of the stocks suffered considerably. The bears have retired in a measure and stocks have shown a more healthy condition. Present indications are that the tide has turned and from this time on the tendency will be upward, and we look for better prices in the near future. It would look as though the time was ripe for purchasers to look carefully into the market.

Ajax, inactive. Alice, quiet. Bullion-Beck—no change in this stock. Chloride Point, quiet. Congor, inactive.

Daly dropped off a little this week. Daly-West did some business this week at better prices. Stock selling at \$12. Dalton & Lark, very quiet, although there has been some high-grade ore marketed this week. Mine is looking splendid. Dexter did some business at advanced prices, although at the close of the week there was a report that a 40c assessment would be levied on the stock. This, however, was not verified. Daisy did a large business again this week at advanced prices. Stock selling above 10c. Enlargement of the mill continues and will be completed in the near future.

Eagle & Blue Bell fell off a little, with very little business done. Four Aces quiet. Geyser-Marion inactive. Galena did a little business at last week's prices. Grand Central advanced a little at the close of the week, with very little business done. The December dividend will undoubtedly be passed. Golden Eagle advanced toward the close of the week. Very little business done.

Horn silver, quiet. Homestake, inactive. Ingots did very little business this week. Joe Bowers did considerable business this week and the stock advanced, but slumped toward the close. A report that the company had settled with the Burnham estate by increasing the capital stock 300,000 shares, making a total of 700,000 shares, giving the Burnham Estate 300,000, caused considerable criticism and the stock dropped off some. Joe Bowers Extension advanced somewhat. Very little stock changed hands.

La Reine made an important strike last week, uncovering some three feet of fine galena ore; reports from the mine today showed a marked increase in the above mentioned vein. Lower Mammoth still continues to decline. Little Pittsburg, quiet. Mammoth rallied this week. Stock sold considerably higher. Very little stock changed hands. Mercur quiet. May Day inactive.

Northern Light did very little business. It

is reported that they are making preparations for a shipment of high grade ore which should have arrived last week. Omaha quiet. Ontario still inactive. Overland seems to be looking well so far. Petro advanced some and did a large amount of business this week. They have made large shipments of high grade ore. Richmond Anaconda inactive.

Sunshine quiet. Swansea was strong this week. Prices advanced somewhat. They doubled their dividend this month, which caused an advance in the price of stock. South Swansea did some business at last week's prices. Sunbeam declined somewhat again this week with very little business done. Sacramento was very strong this week. Good reports have been received from the mine, and I would consider it an excellent purchase at present prices. Silver King steady. Star Consolidated declined again this week, on account of the indebtedness of the mine. There is an effort being made to pay off the indebtedness by private subscription. I have not yet learned what success the company has had in this matter.

Utah quiet. Tesora slumped badly this week. The stock was taken off the Exchange by request of the company. Valeo quiet. Very little business being done in that stock. Yankee Consolidated did a little business at last week's prices. P. J. CONWAY.

## WASHINGTON.

(From Our Special Correspondent.)

SPOKANE, WASH., Dec. 7, '99.

EDITOR JOURNAL: The Republic ledge, at 60 foot level is fully 40 feet wide. This vein has widened with depth. On the first level it was 10 feet; on the second, 25 feet; on the third, 34 feet, and now is fully 40 feet. The south drift is being worked in direction of the Blaine. The porphyry assays \$40.

The cross cut from the bottom of the 60-foot winze in the Quilp ground at Republic is in 20 feet without encountering a wall. Some large assays have been made, \$212 per ton ore in the main tunnel lead has been struck.

East Kootenay is coming to the front in way of mining development and smelters.

The Bull River Mining Co. have to claims that have eight distinct leads running parallel about 500 feet apart. Tunnels one and two are in solid ore. The vein is 27 feet wide. The ore carries copper, lead, silver and gold.

Arrangements are being made for the construction of a silver-lead smelter, at Moyie Lake, to handle the ores of St. Eugene, Lake Shore and other mines. It is calculated that the ores can be treated here at a cost of \$9 per ton and operate at a profit.

The surface assay of gold of the Wild Strawberry, owned by the Chopaca Gold M. & M. Co., on Meyers Creek, was \$3.10, total all values, \$12.98; the last assay from near the bottom of the shaft was \$10.38 in gold, and all values \$15.33.

The Wisconsin Mines are giving encouraging results by development. They are owned and controlled by Spokane capitalists.

The Review, it is believed, will make one of the big mines of Meyers Creek. British Columbia people have secured and are operating this property.

The Poland China is again under bond—to Eastern Canadian people this time. It is not known yet what their plans are, but thorough development is intended.

THOMAS & NEWCOMB.

## Miscellaneous Mining News.

### ALASKA.

Very little is heard in the rail road passenger offices now about the Klondike. The boom in that direction has faded, and the Cape Nome diggings have taken its place. There is one advantage about the Cape Nome country, aside from the reports of the placer diggings are of greater extent and richer than the Klondike, it is in American territory.

The Great Northern road has just issued an illustrated circular giving information about the Cape Nome country.

### ARIZONA.

Wm. T. Smith, the assayer of Los Angeles, reports having received a sample of the ore said to be platinum found near Williams and upon analysis of it could not find a trace of platinum.

The Ray Mine, limited, at Ray, in Pinal County, near Florence, is now employing 400 men in the development of its big copper deposits at that place. It is said the company needed 100 more experienced men. The company has started up its concentrating mill, having a capacity of 250 tons per day and is running full time. The company is preparing to put in about twenty cars of new machinery during December, which includes more mills and other appliances to constitute a complete plant for reducing the ore.

Mr. George P. Blair, general manager of the Mammoth Mine, near Tucson, Arizona, states that it has been definitely decided to install at once an electric power plant on the Aravaipa River fifteen miles from Mammoth. Sufficient power will be developed to run the mill with the additional twenty stamps now being put in, the tramway and the hoists. This will make a wonderful saving in fuel, to say nothing of other expenses. In all probability, with electricity as the power, there will be a saving of over \$50,000 per year in operating expenses. Machinery for the additional stamps is now on the way from Chicago. The foundations to the building are already completed, and the framework will be soon under way. Since it passed into the hands of its present owners, the mine has been a wonderful producer, the mill having been run night and day on the high grade ore. After the capacity of the mill has been increased, and the other improvements contemplated carried out, the property bids fair to be one of the most valuable gold mines in the world.

### CALIFORNIA.

#### BUTTE COUNTY.

Negotiations for the sale of the Cherokee mine have been pending for months until recently, when the negotiations were closed and the mine was sold to a Pittsburg syndicate. The new owners propose to work the mine for all the gold there is in it. An immense plant will be put in. Drifting will be in process. It is said that the first operation will be at the base of Table Mountain, within a short distance of the old Wicks plant.

## CALAVERAS COUNTY.

Some rich developments have been made in the Big Bonanza Mine, South of Angels Camp, which have caused the stock to take a jump from 50 cents per share to \$2.50. Sinking is going on and the shaft has reached a depth of 300 feet. At this point some rock was encountered, some of which will go as high as \$1,900 to the ton.

## KERN COUNTY.

The Pinmore mine, near Johannesburg, has changed ownership. The mine contains a heavy body of low grade ore. A 10-stamp mill formerly at Garlock is to be transferred to the property and equipped with the latest gold-saving apparatus.

## RIVERSIDE COUNTY.

Jacob and Charles Yager and Maximo Lopez have placed on record in Riverside County papers for the United Verde, Scandia, Red Queen and Prince mines, which are situated in the San Juan Mountains. J. B. Cook also scored by recording the Relief No. 2 Mine, which is situated in the Cottonwood District.

## SAN DIEGO COUNTY.

A new mining section known as the Vallecitos District, between Ramona and Poway, on the grade leading from Poway into Santa Maria Valley, is attracting attention.

## SISKIYOU COUNTY.

The mill at the Mabel mine, between Oak Bar and Scott Bay, started to crush quartz last week, which shows very good prospects. The mine paid handsomely when opened by Dr. Timmons and W. A. Chamberlain, the former owners.

## COLORADO.

A mining deal of considerable size and importance was recently closed. The deal included the sale and transfer of two well-located claims in the Cripple Creek District to the Constantine Consolidated Mining Company, which had been incorporated for the purpose of holding and working the same.

The claims in question are the Constantine and Julia E., comprising a little over 10 acres of patented ground and for which a price in the neighborhood of \$100,000 was paid. The deal was promoted by Messrs. J. R. McKinnie, N. S. Gandy and L. R. Ehrich, who completed the purchase of the property and organized the Constantine Company to operate the claims. The deal has been on foot for some time, but it is now finally consummated the papers are signed, the deeds turned over and the company perfected its organization.

The new company is capitalized for 1,500,000 shares at the par value of \$1 per share. Of this amount 400,000 shares have been set aside in the treasury and in addition to this amount of stock the treasury will also contain about \$10,000 in cash. The officers of the company are: L. R. Ehrich, President; J. R. McKinnie, Vice President; N. S. Gandy, Secretary, and George E. Hasey, Treasurer. These gentlemen, with W. C. Stark, compose the directorate.

## LAKE COUNTY.

The Moyer zinc mill, with a capacity of 100 tons per day, has been started on ore from the Moyer shaft of the Iron Mining Company. Fourteen tables will concentrate the ore and

produce a high grade of both zinc and lead concentrates. It is expected that the zinc product will run about 45 per cent. metallic zinc.

The A. V. and Minnie is reaching a high average in its daily shipments. The October product was 600 tons of smelting ore and 600 tons of concentrates that yielded 25 to 30 per cent. lead. Development is kept constantly in advance of production, and large ore bodies are being opened up which guarantee a long life to the present workings.

The Chippewa lease recently started by R. B. and N. M. Estey, is in a fair way of occupying a high place among the Breece Hill gold producers. Two shafts have already been started and a third is soon to be put down. The three shafts will be on the east and west line and will be sunk with a view of catching the Penn and Ballard ore bodies on their southerly extension.

The Yak tunnel is now in 8,200 feet, the breast being in the N. Rollins claim, a few hundred feet from the west end of the Golden Eagle. Fifty men in three shifts are employed and the cost to date has been about \$800,000. It will cut the Breece Hill formations at a depth of 1,100 feet and probably tap the Little Johnny ore bodies at about 1,300 feet from the surface, 600 feet below the present workings. It is not unlikely that the tunnel will be continued on to the Resurrection and other claims on Little Ellen Hill.

The Ruby, on Iron Hill, is steadily pushing the drift to the big ore body left standing on its line by the Colorado No. 2. This ore chute is 18 feet wide, by 14 feet thick, and will net \$7 per ton above smelting charges. Occasionally streaks of ore encountered yield astonishing values in silver and gold.

## SUMMIT COUNTY.

The drill to be used by the Oro Grande Mining Company in prospecting its placer ground in the vicinity of Dillon, has arrived, and is being set up by John Osgood, who has had considerable experience in drilling in the oil fields of Pennsylvania. The second drill ordered by the Messrs. George E. West and F. R. Blount is expected to arrive in a few days, and will be used in testing the placer ground owned by them south of Breckinridge.

At the Finding shaft on the "Jones" group on Shock Hill, Superintendent Marvel had everything running smoothly. As soon as the station at 300 feet from the surface and the dump have been excavated, drifting will be done on the large iron sulphide blanket vein which was recently opened in this shaft.

One of the most phenomenal discoveries of copper and silver ore ever made in Colorado, according to the *Daily Mining Record*, was brought to light on Dry Creek, about four miles from the San Miguel river, near Placerville, San Miguel County, two weeks ago. The first reports were, as frequently happens, greatly exaggerated the claim being advanced that the ore at the surface ran upwards of \$1,000 to the ton. Later advices, while modifying these values materially give results of tests which show values that should satisfy any reasonable man, yielding a trace of gold, 122.3 ounces silver and 33 per cent. copper, 122.3 total value being not far from \$158 per ton.

An item of special interest in connection with this find is the fact that the most important discovery was made by James Blake, the man who, about three years ago made the

discovery of rich ore at Saw Pit, in the same county. A number of prospectors had been working to open up the contact veins of that section, but had failed and were about to suspend operations when Mr. Blake, by a bold stroke, solved the problem for them. He drove straight ahead through the sandstone, and by a lucky shot exposed the contact deposit, from which more than \$2,000,000 has since been taken out.

## MICHIGAN.

The Quincy Mining Company, near Hancock, Hoyton County, is building a new machine shop just below No. 6 shaft. The structure will be 145 by 62 feet in size. The foundation wall is five feet high. On this is a brick wall. The work is being delayed by non arrival of the structural iron work, which was ordered two months ago. It is expected now to have the building under roof by Christmas.

A boiler house for No. 6 shaft is being erected behind the machine shop. Structural iron work for this is also delayed. It will be equipped with four water tube boilers, which will be set up in ten days. The smoke stack will be 100 feet high, and set on a big stone foundation. It will have no guy wires, but will be built up with a brick wall inside.

Efforts are being made in Philadelphia to organize a mining company with a capital of \$2,500,000 to take over the old Delaware Mine, also known at different times as the Lac La Belle, Conglomerate, and last winter as the Pawnee, when a company was partly organized. The property is located well toward Keweenaw Point, and is a very extensive one, having some 22,000 acres on the mineral belt. It possesses three amygdaloid lodes, carrying copper and one conglomerate, supposed to be the same as that operated by the Calumet and Hecla. The property has an equipment costing upward of \$500,000, which has been carefully looked after since the closing of the mine, some ten years ago.

## MISSOURI.

Owing to the strike of the miners in the Kansas coal fields, from which comes the entire supply of coal for this district, there is imminent prospect of a coal famine. Only a small fraction of the usual amount is being shipped in and railroads and mining plants are all short. The efforts to replace the striking miners with non-union men from West Virginia has proved abortive. A short time ago the Missouri Pacific road brought in a large number of miners from West Virginia, but they only worked a few days, then joined the union and left the mines idle.

Several of the large producers of high grade ore are negotiating directly with foreign metal manufacturers. The contracts will be made for the entire output of the mines in the pool for six months, and it is said that the price offered is nearly as good as the domestic smelters are paying and fully as good as they are likely to pay in the near future.

## MONTANA.

## Libby Notes.

The concentrator on the Buzz Saw Mine has started up and is now running on about 70 tons of ore a day. The capacity of the plant is 150 tons, but, owing to a defect in

the machinery, the above amount is all that can be put through at the present time.

Information brought down from the West Fisher is to the effect that the 10-stamp mill, which the Fisher Creek Mining Company has been building on the Brick & Brannagan properties in that section the past summer has been completed, and the stamps are now dropping on the ore. Only five stamps were started up at first to test the plant, and it is reported that everything is all right, and that the plant will be run to its full capacity from now on.

William Beager, manager of the American Kootenai Mining Company, has received notice that one carload of machinery left Chicago for this place, and the remainder of the plant will follow in a short time. This machinery is for a 10 stamp mill, which this company will put up on its property on the West Fisher in the spring.

## NEVADA.

It is given out that the Young America Mining Company, operating at Tuscaroro, Nevada, has decided to begin at once the erection of a mill on this promising property, the plant to embrace ten stamps to begin with, with room left for additional batteries, the tailings to be handled later on by the application of the cyanide process. Charles Ford, who has had charge of the construction of several Utah mills, will superintend the erection of the new works.

Shields, Morgan and Logan have done a large amount of work the past season on the Wasson, Mt. Grant, Esmeralda Co. A 500-foot tunnel cuts the ledge 300 feet deep. The ledge is about three feet thick, and the ore mills all the way from \$10 to \$50. They have shut down for the winter.

## NEW MEXICO.

### Hillsboro Notes.

The ore from the Lookout mine, owned by Hon. J. M. Webster and Col. J. P. Parker, of Hillsboro, was assayed this week by Chemist Aloys Preissner and yielded the enormous value of \$55,000 in gold and silver to the ton! This is certainly the richest strike of ore ever made in this section, if not in New Mexico. The treasure was uncovered by Knight & Ricketson, who are operating the property under lease.

This week the Richmond made a twenty-seven ton shipment of \$160 gold and copper ore to the Colorado smelters.

A. Engleman has sold his mine to County Clerk Hall. Consideration \$2,000 cash. Mr. Hall has ordered a gasoline hoist.

The Snake leasers are sacking a forty-three ton shipment of \$220 ore for the Silver City smelter.

Gales & Dissinger have located a seven foot ledge of 28 per cent copper ore in the Cabello mountains.

An \$80 gold nugget was found in the Hillsboro placers this week by Ed. Strickland.

Three tons of gold and copper sulphide ore valued at \$480 per ton was hoisted from No. 2 shaft of the Trippe, last week. The vein at this point is fourteen inches wide.

The Chance mine, of the Sinnamohoning Co., group, is now hoisting ore valued at \$348 per ton, gold and copper. Manager Brooks will probably have all four mines of

this productive group shipping by March 1st, next. Gravity ore bins will be put in at all of them.

Mr. Bickford, owner of the Johnson, has contracted with Carpenter Nelson for the immediate erection of an ore house of 2,000 tons capacity.

Hon. W. S. Hopewell is erecting a tramway at his Hibernian mine.

The Trippe, Porter and Charter Oak mills are receiving their winter's supply of fuel, and thus giving employment to thirty or more woodhaulers.

A check for \$3,900 was received by the owners of the Odell mine, one day this week, in payment for their last shipment of ore.

By the consolidation of the K. K. and Butler Mining Companies, which occurred this week, the product of these properties is now being mined for \$4 per ton instead of \$7, as formerly.

## OREGON.

The Powell Creek Mining Co., have re-deeded to Sharp Brothers, Morris & Hosier the Powell creek property at Williams, as the members of the Company could not agree. The former owners still believe the property valuable, but as they were unable themselves to operate it they decided on account of extension of time, etc., and other considerations, to turn the property back to the original owners.

### Catharine Creek Mines.

Mr. William James, of La Grande, who owns the controlling interests in the Black Eagle, Golden Crown, Anna J. and Jack's Dream group of mines, located at the head of Catherine Creek, Baker County, has received returns from samples of ore from these mines he had assayed, that shows a most wonderful degree of richness, all the way from \$13 to \$173. Parties who have been investigating the mines make the most flattering reports, and predict they will prove eventually as rich as any that have ever been discovered in the Sumpter, Cornucopia, Cracker Creek, or any other mining district in Eastern Oregon.

## SOUTH DAKOTA.

The British-American Gold & Copper Mining Company of Detroit, which is developing a gold property in Butcher Gulch, seven miles east of Deadwood, has put on a night shift and the work will be pushed along more rapidly.

A force of men are constantly employed on the Copper King group, which is under bond and lease to Col. M. H. Day and associates. This is a very promising property, the ore being a carbonate, which assays from 23 to 50 per cent metallic copper, and is located ten miles northwest of Custer in Pennington County.

The Portland Company has just set up an 85-horse power boiler and a new air compressor, on the Greenough ground, at Bald Mountain, which the Portland has under bond. The company is drifting with a view to striking the lower contact on the Portland, at a depth of about 600 feet from the surface, and it was necessary to cross the Greenough claim to reach the desired point with a tunnel, which is now about 1400 feet in length, the air compressor will enable the men to work to better advantage than heretofore.

## UTAH.

From Chloride Point Mine at Mercur good reports are received. Shipments of cyanide this week show a marked improvement. They are able to treat the ore at much less expense than formerly, and this leaves a nice profit in the hands of the company after paying all expenses.

The Four Aces Company at Silver City has filed a suit for damages amounting to \$450,000 against the South Swanska Company. The complaint is that they are taking ore from the Four Aces ground.

La Reine Mine at Eureka is improving and the ore body is showing up well. They will be able to make shipments in January.

The Mammoth Co. of Mammoth will probably pay a dividend the first of the year.

A new strike is reported from the Northern Light Mine, and it is understood from the management that the mine is now looking better than it has for some time.

Petro Company of Bingham have discontinued ore shipments for the balance of this year.

At the last meeting of the Star Consolidated Co. of Silver City the stockholders voluntarily agreed to pay an assessment of 10 cents per share. The stock is non-assessable, but this agreement seemed agreeable to nearly all of the stockholders, so it is presumed the indebtedness will now be liquidated. The report was that the mine was in excellent condition.

The Sacramento Mine at Mercur is looking well and dividends are expected before the close of the year.

## WASHINGTON.

The Republic Reduction Works is receiving machinery ordered some time ago. They expect to be in operation about February 1st. It will have a capacity of 74 tons a day and will do custom work. This will enable the mines in that camp to market their ore and avoid shipping for long distances. Thirteen men are employed on the foundation for the mill.

Bodie has reached a depth of 342 feet and shows two and one-half feet of clear quartz in the vein and about the same width of mixed quartz. At a depth of 350 feet it is proposed to put in a station and commence drifting on the vein toward the San Poil ground at Republic. They expect to catch a pay chute on this level. They are now expecting their new machinery to arrive most any day.

In Number 2 tunnel of Republic Mine the cross cut on the south drift is completed and the ore body is found to be 53 feet in width. The entire body is of good value and will be run through the new mill when completed. The main south drift has about 300 feet to run to reach the Jim Blaine line.

The Palmer Mountain tunnel has reached 2546 feet in length, gaining 1200 feet vertical depth. It has cut 15 veins and they are drifting on seven of them, all of which are making fine showings. It is claimed over \$100,000 has been spent in development, and that they have \$100,000 for future work and a large amount of treasury stock on hand. The last 500 feet run in the tunnel cut three more veins, one of which carries six feet of

high grade ore. The ores are found to be greater in value and more evenly distributed in the veins as depth is gained, placing beyond question their permanency.

A sensational suit has been filed in the Superior Court at Spokane, W. C. Sivyer et al against G. A. Sonneman and Jay Lawyer. The complaint alleges that the Dora Gold mine was salted with Republic ore.

## FOREIGN MINING NEWS

### BRITISH COLUMBIA.

The Rossland shipments of ore for the year to December 1st amounted to 164,408 tons.

Ramble-Cariboo declared another dividend of one cent per share, payable January 1, 1900. The dividend declared last month has just been paid. There is said to be enough ore in sight for three years' operations. Up-raises are being made from the 350-foot level. The lower tunnel is being run beyond the vein, to tap at greater depth another chute of ore that is known to exist.

The crosscut from No. 3 tunnel, in the I. X. L., has been driven 55 feet, and is expected to strike the ledge shortly. It will give a depth of 150 feet on the ore.

Some 60 men are now employed preparing ground and buildings for machinery ordered for the Greenwood smelter. The stone foundation for sample mill will be 60x100 feet in size. The big flues to carry fumes from the furnace is nearly completed. The frame store house, 24x44 feet and blacksmith shop, 20x30 are finished. Stables will accommodate 10 horses, and is 28x45 feet and the carpenter shop is 26x46.

### MEXICO.

One of the best propositions at Alamo, Lower California, is in the hands of John M. Albright and Thomas Kueale of San Diego. They are working over the tailings of the Princess Mine, and now have the work about one-third completed. The dump contained in the neighborhood of 5,000 tons of tailings. The cyanide process is used. Albright & Kueale expect to purchase the tailings of other mines in the camp. Altogether the camp is in better condition than since its discovery. Many claims located in the early days, but never worked, are turning out to be the best in that section.

The company of Pittsburg capitalists working the San David, Telemaco and Ulysses claims, formerly owned by the Princesa Company, are apparently making a good thing of it. They have 90 men in their employ, under the direction of Geo. P. Brown, and expect to buy the three claims upon the expiration of their bond, about the first of the year. Other companies, notably the one in which Senator Cockrell of Missouri is interested, are doing well.

The Guanajuato Consolidated Mining and Milling Company has no trouble supplying its present mill, which is crushing steadily 50 tons of ore a day. Its October production was about \$20,000.

The management of La Discubriadora Mine, thirty miles west of Mapimi, Durango, has contracted with the El Paso Foundry and Machine Company for two new furnaces of 300 tons capacity each, so that when completed the smelting capacity of this mine will

be 1,050 tons a day. The company will build a railroad from Mapimi to the mine in the near future.

La Bufa, the silver mine near Barranca, Sonora, paid a dividend of \$1500 per share in November. It is owned by Colorado parties.

J. J. Moylan has entered into a contract with M. P. Boss, whereby the latter will develop the rich mining properties of Mr. Moylan in Guerrero.

The registration of new mines continues in Durango, not only by Mexicans, but by Americans as well. Most of the new mines are gold and silver bearing.

### Latest Mining Decisions.

Prepared for THE MINING AND METALLURGICAL JOURNAL, by Andrews & Murdoch, Berrien Springs, Michigan.

Credit must be given when reprinted.

The statute respecting the location of mining claims should be construed with liberality, and the sufficiency of the location, with reference to natural objects or permanent monuments, is simply a question of fact. Farmington Gold-Min. Co. vs. Rhymney Gold & Copper Co., 52 Pac. Rep. (Utah) 852.

Whether or not a mining claim is marked on the ground sufficiently to show a compliance with the first clause of section 2324, Rev. St. U. S. is a question of fact, to be determined from proof aliunde, and the manner of marking is not required to be stated in the notice. Farmington Gold-Min. Co. vs. Rhymney Gold & Copper Co., 58 Pac. Rep. (Utah) 832.

Where a mining location is made in good faith, the locator should not be held to a strict technical compliance with the law in respect to his location notice, and if, by any reasonable construction, in view of the surrounding circumstances, the language employed in the description will impart notice to subsequent locators, it is sufficient. Farmington Gold Min. Co. vs. Rhymney Gold & Copper Co., 58 Pac. Rep. (Utah) 832.

The trial court having found, inter alia, that plaintiff and its grantors have been in possession since location, and they have complied with the laws of the United States, and the local laws, customs, and regulations of the mining district, and the record containing no evidence to the contrary, this court must assume that the finding is correct, and hold that the claim was sufficiently marked on the ground. Farmington Gold-Min. Co. vs. Rhymney Gold & Copper Co., 58 Pac. Rep. (Utah) 832.

### GENERAL NEWS

#### California Iron.

Amid the great boom in the field of iron production, it doesn't cost anything to remember that California has some of the richest and most immense iron deposits which nature has gathered in small places about this world, and that economic conditions will probably arise which will in the not so very far distant future make these stores of iron things to be reckoned with in the great iron markets of the world.

While immense bodies of valuable iron ore occur in a number of localities from Shasta, Nevada and other Northern Counties, to the South, the greatest deposits are in San Bernardino and Nevada Counties. If these de-

posits were as near to the transportation, smelting, market and other conditions of the iron trade as the ones of the Mesaba range in Michigan, the latter, for which lake freight rates have more than doubled, would be in eclipse.

Probably the largest deposit on the coast is in San Bernardino County, sixteen miles from Newberry, in the desert, and this is one of the largest deposits of iron in the United States. It has been frequently described in official reports, but it has never yielded a pound of iron. Then at the minarets in Madera County in the Sierra Nevadas is another wonderful store of iron. It is a hematite and magnetite ore running from 64 to 66 per cent of iron, and one vein exposes a mass 300 feet wide, 1500 feet high and two miles long. What is in sight would supply the world for years. The other iron stores of California are varied and vast.

The trouble with California iron ores is, of course, that with the cost of fuel and so on out here, a ton of Alabama pig iron can be brought here for about the cost of the fuel to smelt a ton of California ore. California's stores of iron are away from both transportation and fuel. But while the iron trade is booming and ruling the industrial world and being its barometer, we may also remember that in California's great future the time may come ere long when the production of iron, which cuts absolutely no figure now, will be one of the great factors in its mining and industrial life. California iron ores will be smelted whenever conditions allow a profit on the operation. How and when these conditions will become present will not be prophesied here. But every related prospect seems to lend to the ultimate production of California iron ore.

The multiplication of cheap electric power in the Sierras is one thing. The oil boom with its great possibilities of the production of cheaper fuel in the forms of oil and gas presents another possibility. Almost in sight of the towering minarets above the San Joaquin Valley men are swarming over the ground in which nature has stored fuel and the vast tonnage of the Great Lakes cannot take Michigan iron ore fast enough at treble rates toward Pittsburg over several times the distance from the minarets to the oil fields or the coast.

Mr. Guillermo C. Dingey, who has been general manager of the Pachuca Foundry in the State of Hidalgo, Mexico, for the last five and a half years, left the Pachuca for Chihuahua. Mr. Dingey will assume the position of General Superintendent of the Compañia Industrial Mexicana de Chihuahua.

Work on the Parral and Durango Railroad has been suspended, owing to certain difficulties existing between the contractors and directors of the road. The matter, it is understood, will be settled in the United States courts, as all contracts and agreements were signed in the United States.

Mining in Southern California has received such an impetus and new investors are making so many inquiries concerning same that we have been compelled to refer our readers and others to our article "Mining in Southern California" by O. S. Breese, in our issue of November 15, 1899, page 43.

The article referred to does not give any detailed information regarding the produc-

tion of any particular mines, or their location, but treats of the industry generally as it is at present in the Southern part of the State of California. Our readers and subscribers are invited to correspond with our Los Angeles office when seeking information concerning the mining progress of the West, and same will cheerfully be furnished.

## PERSONAL NEWS ITEMS

LEW E. AUBURY, mining engineer of Los Angeles, has returned from extensive mine examinations in the Dos Cabezos District, and in the vicinity of Bisbee, Arizona.

D. C. JACKLING, who for some time past has been Superintendent of De Lamar's Golden Gate Mill at Mercur, Utah, has accepted the superintendency of the Republic Mill Co. at Republic, Wash.

AUGUST CHRISTIAN, chief engineer of the Anaconda Copper Mining Company, of Butte, Mont., has been looking over mines about Copper Creek, Colo.

JNO. M. WRIGHT succeeds A. H. RICKETTS in the chairmanship of the Mineral Lands Committee of the California Miners' Association.

FORAES RICKARD, of Central City, Idaho, has been in Clear Creek County during the past week looking at mining property for Colorado Springs parties.

H. D. CRIPPEN of the Jackson Drill & Mfg. Co. of Denver, Colo., has returned from a trip through New Mexico.

ROY HOPPING, dealer in and collector of mineral specimens, has changed his New York address from 5 Dey street to 129 Fourth Avenue.

J. G. B. HOLLINGSHEAD, of Montana, is examining California copper properties for the Butte & Boston Mining Co.

R. M. JESSUP, of Central City, Colo., has been appointed assistant superintendent for the Gold Coin Mines Company, operating in Gilpin County.

E. BOYCE, President Western Federation of Miners, is now in Butte, Montana.

HUGH SUTHERLAND, managing director of the Dominion Copper Mines, Limited, of the Boundary District, B. C., and W. A. CAMPBELL, of Greenwood, B. C., have been visiting Republic, Wash.

T. A. RICKARD has returned from London to Denver, Colo.

BEN WILLIAMS has resigned his position as manager of the Copper Queen Consolidated Mining Company at Bisbee, Ariz. It is said that Mr. Williams' successor will be Mr. Walter Douglass, son of the President of the company.

F. W. BRADLEY has returned from Grass Valley, Cal., to San Francisco.

JOHN V. N. DOTT, who has been acting as chemist for the Golden Reward Smelter, has resigned to accept a similar position with the Northwestern Gold and Silver Extraction Company, that is running a cyanide plant at Deadwood, S. Dak.

BENEDICT CROWELL, of the firm of Crowell & Peck, of Cleveland, Ohio, is in Salt Lake City, examining mining properties in various camps in the vicinity.

DUDDY GRAY is collecting Cripple Creek, Colo., gold ore as specimens for exhibition at the Paris Exposition.

JOHN B. LAW has resigned his position as general manager of the collieries of the Newton Coal Mining Company at Pittston, the Old Forge Coal Company at Duryea, and the Girard Coal Company at Mt. Carmel, Pa. He is succeeded by James C. Neale. The controlling interests of these companies is held by Philadelphia men, with Frank Patterson as president.

C. L. DIGNOWITY, the successful mining promotor, was in Salt Lake City last week, and during his stay there devoted considerable time in making an inspection of several of Utah's most popular mining camps.

W. J. CLARKE, foreign manager of the General Electric Co., expects to return from South America next month.

THEO. F. VAN WAGENEN, of Denver, Colo., who visited Grants Pass last September, returned to Grants Pass last week.

GEO. E. AMES, JR., of the City of Mexico, Mex., until recently with Messrs. Samuel Hermanos, has severed his connection with that firm and opened a machinery and general mining supply house.

C. H. MCINTOSH, of British Columbia, is examining mining property at Sumpter, Ore.

DR. F. P. HICKS, a Tacoma, Wash., mining man, has returned from Ketchikan, Alaska.

W. H. NONNOLD, formerly of Calaveras, Co., Cal., is now manager Coronado Mine, Metcalf, Arizona.

G. H. KINGSWELL, and W. H. Shockley have finished a mineral survey in the Chinese provinces of Shensi and Shansi.

E. A. KISSLING, foreman of the Oregon Bonanza property, was in Grant's Pass, Oregon, last week, from Williams. He says the Oregon Bonanza people have started a tunnel on their property, to tap the ledge at the depth of 350 feet, they are now in 45 feet, and working two shifts of men. He says the shaft they have down 140 feet shows a 3½ foot solid ledge of copper ore and runs \$74 to the ton.

HERMAN LANDAU succeeds Jas. Judd as chairman Associated Gold Mines of Western Australia.

J. W. HANSON, of the San Francisco Giant Powder Co., is in Tucson, Arizona.

## NEW INCORPORATIONS IN THE MINING AND METAL INDUSTRIES

### CALIFORNIA.

Poso Oil Co., Fresno. General oil business. Capital, \$100,000. Incorporators: W. H. Bradley, of Selma; L. G. Hall, J. S. Bedford, G. L. Long, F. M. Hague, S. McKay, W. D. Fook, all of Fresno, and others.

Mammoth Oil Co., Fresno. General mining business. Capital, \$300,000. Incorporators: H. M. MacLymont, J. Berry, G. L. Hoxie, H. C. Smith, all of Fresno; F. B. Lindsey, of Sanger.

Kern & Trinity Mines Co., San Francisco. General mining business. Capital, \$200,000. Incorporators: G. L. Blair, E. C. Ward, W. H. Davenport, H. C. Caulelow, all of San Francisco; W. H. Waterhouse, of Oakland.

Wallace Gold Placer Mining Co., Stockton. General mining business. Capital, \$100,000. Incorporators: W. Tucker, L. W. McKee, A. J. Taylor, H. N. Toemper, A. N. Petty, A. C. Miller, all of Stockton.

Fortuna Mining Co., San Francisco. General mining business. Capital, \$50,000. Incorporators: F. W. Schurman, W. Bohle, C. F. Fahrbach, H. F. Petersen, W. G. Stahl, Jr., all of San Francisco.

Golden Gate Oil Producing Co. General mining business. Capital, \$100,000. Incorporators: W. R. Thomas, D. O. Castle, S. E. Latta, W. J. Rhoads, S. M. Spurrier, all of Stockton.

Mendota Oil Co., San Francisco. Capital, \$500,000. Incorporators: F. S. Chadborne, H. J. Barling, W. B. Wilshire, W. D. Sanborn, W. H. Snedaker, all of San Francisco.

Sonora Quartz Mine Development Co., San Francisco. General mining and milling business. Capital, \$500,000. Incorporators: E. L. Coombs, of Napa; F. B. Lloyd, H. E. Wise, J. Kirby, J. Garland, H. N. Start, F. B. Lloyd, F. Homer, all of San Francisco; R. G. Hart, Sr., H. R. Wiley, both of Berkeley.

Celtic Gold Mining Co., San Jose. General mining business. Capital, \$15,000. Incorporators: E. J. Crawford, W. E. Blauer, T. A. Perrin, J. W. Edmundson, of San Jose; G. Deeney, of Columbia.

Numitor Gold Mining Co., Chicago Park. General mining business. Capital, \$200,000. Incorporators: C. A. Pusheck, R. Riley, A. R. Pusheck, W. McDonald, W. Sternitzky, all of Chicago Park.

Western Land & Oil Co. of Hanford, Hanford. General mining business. Capital, \$250,000. Incorporators: O. P. Lane, J. H. Doplins, A. Leoni, J. T. Ramsey, A. G. Park, all of Hanford.

St. Valentine Mining Co., Santa Barbara. General mining and milling business. Capital, \$100,000. Incorporators: A. B. Willms, G. F. Frenwith, C. Loveday, A. C. Grant, W. R. Grant, J. H. Burson, T. R. Dawe, W. Ealand, C. A. Storke, all of Santa Barbara.

Louis Creek Oil Co., Hollister. Mining. Capital, \$100,000. Incorporators: G. N. McConnell, E. E. Holbrook, P. F. Brown, R. P. Stephenson, all of Hollister; P. E. G. Auger, S. F. Saffell, N. C. Briggs, W. K. Brown, all of San Juan.

Victor Oil Co., San Francisco. Mining. Capital, \$500,000. Incorporators: C. Bone, W. W. McNair, J. H. Sayn, B. C. Hartson, H. R. Hathaway, all of San Francisco.

S. P. Placer Mining Co., Fresno. Capital, \$200,000. Incorporators: R. S. Bademan and others.

Northfield Oil Co., Fresno. General mining business. Capital, \$200,000. Incorporators: A. B. Smith, H. Nathan, G. W. Wyllie, C. A. Telfer, all of Fresno; I. F. Paston, of Selma; C. D. Pike, of San Francisco; E. Seligman, of Dinuba.

Merchants' Mutual Oil Co., San Francisco. General mining business. Capital, \$200,000. Incorporators: G. J. W. Stark, C. W. Camm, of Oakland; J. L. McCormick, J. A. Stutz, J. I. Sparrow, T. L. Heimer, A. B. Knox, F. E. Booth, all of San Francisco; G. W. Forsyth, of San Jose.

Twin Eagle Mining Co., Downieville. General mining business. Capital, \$50,000. Incorporators: J. N. Hastings, J. S. Wilbur, E. McGary, Jr., J. W. McGary, all of San Francisco; F. G. Gould, of Alameda.

Wheatville Oil Co., Wheatville. General mining business. Capital, \$28,000. Incorporators: E. A. Wait, W. W. Bloyd, Sr., D. C. Francis, A. M. Bentley, T. Cowan, all of Wheatville, and others.

Belmont Oil Co., Los Angeles. General mining business. Capital, \$200,000. Incorporators: W. A. Johnson, Los Angeles; G. L. Lindsay, J. J. Newman, E. Rhodes, H. Percy, C. E. Newman, all of Chinon.

East Side Oil and Gas Co., Visalia. General mining business. Capital, \$272,000. Incorporators: D. Calcote, J. W. Fewell, R. F. Roth, all of Visalia; O. Kellogg, of Parlier; J. E. Elwood, of Sanger.

Oakland Oil Co., Oakland. General mining business. Capital, \$20,000. Incorporators: D. D. Stark, A. J. Samuel, of Alameda; W. T. Sesnon, of San Francisco; C. S. Banard, E. R. Tubb, both of Oakland.

West Shore Oil Co., Oakland. General mining business. Capital, \$20,000. Incorporators: M. McWhorter, of Bakersfield; A. J. Samuels, of Alameda; J. M. Bartlett, W. E. Knowles, of Oakland; S. Gale, of Berkeley, and others.

Black Mountain Mining Co., Selma. General mining and milling business. Capital, \$100,000. Incorporators: M. Sides, J. F. Davies, E. B. Waterman, all of Selma; L. L. Cory, of Fresno; J. Noonan, D. S. Snodgrass, both of Letcher.

Buckhorn Oil & Transportation Co., San Francisco. General mining business. Capital, \$200,000. Incorporators: M. I. W. Smith, J. H. Doolittle, G. B. Merrill, M. L. Davis, W. Ames, all of San Francisco.

Santa Rita Gold Mining Co., San Francisco. General mining and milling business. Capital, \$100,000. Incorporators: W. Delaney, L. H. Levesque, J. B. McGlew, W. W. Sanderson, all of San Francisco; J. J. Kilbride, of Oakland.

Reedley Oil Co., Reedley. Mine for oil. Capital, \$250,000. Incorporators: J. S. Jones, A. B. Clark, H. F. Winnis, W. W. Green, J. Saile, all of Reedley, and others.

Tar Canyon Oil Co. General mining business. Capital, \$100,000. Incorporators: F. H. Gibson, P. A. Bergerot, W. I. Broeck, G. B. Gibson, J. A. Wilson, M. McGowan, all of San Francisco.

Basin Consolidated Mines, San Francisco. General mining business. Capital, \$100,000. Incorporators: H. F. Buwer, of London, England; J. O. Whitney, W. Martin, J. S. Severance, C. H. Ludley, R. G. Hart, Sr., all of San Francisco.

Commonwealth Oil Co., Stockton. Mining business. Capital, \$100,000. Incorporators: H. M. Hammore, of San Francisco; J. Doyle, A. R. Hopkins, J. K. Dempsey, M. Bracco, A. V. Scanlon, J. W. Petty, all of Stockton.

Red Slide Mining Co., San Francisco. General mining business. Capital, \$24,000. Incorporators: M. E. Sanborn, of Yuba City; P. S. Turner, Annie M. Turner, both of Oakland; J. N. Turner, E. H. Hart, both of San Francisco.

Cantura Oil & Development Co., Fresno. Mining business. Capital, \$300,000. Incorporators: A. Gordon, T. E. Langley, W. M. Wyatt, D. C. McDonald, G. W. Smith, A. E. Snow, G. W. Wyller.

Iowa Mining Co., Fresno. General mining business. Capital, \$30,000. Incorporators: C. S. Pierce, D. C. Johnston, D. A. Jackson, all of Fresno; E. P. Taylor, of Marion; T. R. Warriner, J. Q. Anderson, both of Cedar Rapids, Ia., and others.

Plumas Star Mining Co., San Francisco. General mining business. Capital, \$100,000. Incorporators: W. T. Wallace, W. H. Martin, H. R. Mann, T. B. Bishop, C. S. Wheeler, W. W. Deamer, all of San Francisco; E. C. Robinson, of Oakland.

Buckeye Oil & Development Co., Kern. General mining business. Capital, \$25,000. Incorporators: E. D. Jones, of Tulare; W. A. Snyder, C. J. Pierson,

C. H. Luce, E. C. Ralston, J. W. Shaffer, all of Kern; W. P. Lowry, of Los Angeles; S. N. Reed, of Bakersfield.

Morris-Jones Oil Co., Los Angeles. Mining business. Capital, \$4,000. Incorporators: W. W. Slayden, C. M. Jones, M. Van Sickle, P. W. Dooner all of Los Angeles; H. R. Slayden, of Pasadena.

Germania Oil Co., Modesto. Mining business. Capital, \$100,000. Incorporators: H. Christ, A. Sleivater, A. Seller, O. McHenry, T. C. Hocking, H. Vogelman, J. E. Ward, all of Modesto; J. Simon, of Stockton; W. W. Brown, of San Francisco.

Rocket Mining Co., San Jose. General mining business. Capital, \$200,000. Incorporators: J. A. Hicks, of Los Gatos; H. H. Main, W. Ostermar, W. J. Rogers, F. J. Brandon, all of San Jose.

Dewey Mining & Milling Co., San Diego. General mining business. Capital, \$1,000,000. Incorporators: L. F. Doolittle, J. A. Heath, S. G. Ingle, W. R. Farnsworth, F. P. Frary, G. Puterbaugh, J. S. Akerman, all of San Diego.

Harford Cholame Oil Co., Hanford. Mining business. Capital, \$250,000. Incorporators: N. Weisbaum, R. Mills, J. Manasse, all of Hanford; J. W. Fisher, of Parkfield; J. Levy, A. Goldberg, C. E. Barker, all of Visalia.

Gaba River Gold Dredging Co., San Francisco. Dredging, mining, etc. Capital, \$110,000. Incorporators: H. Hilp, G. A. Kornberg, A. Cerf, W. W. Prentley, H. Fress, all of San Francisco.

Alliance Oil Co., San Francisco. Mining business. Capital, \$100,000. Incorporators: A. P. Umbens, H. A. Buck, of San Francisco; J. G. McCall, R. W. Church, both of Oakland, E. C. Chapman, of Warren County, Pa.

Alta Oil Co., Dinuba. General mining business. Capital, \$100,000. Incorporators: J. D. Pillsbury, Q. A. Boyd, of Traver; E. Seligman, S. K. Green, R. E. Morton, all of Dinuba, and others.

Richfield Oil Co., Fresno. Mining business. Capital, \$100,000. Incorporators: J. Hall, A. P. Shepard, J. A. Benham, J. R. Green, B. T. Scott, M. Saier, all of Fresno; J. W. Whitson, C. Chisholm, J. H. Hall, all of Selma.

Klamath River Hydraulic Mining Co., San Francisco. General mining business. Capital, \$100,000. Incorporators: T. T. Tighe, of Trinidad; W. H. Cameron, H. Stevens, J. P. Tighe, A. G. Allen, all of San Francisco.

#### COLORADO.

Pleasant Valley Silver Lead Mining Co., Central City. Mining business. Capital, \$100,000. Incorporators: J. Mitchell, Jr., H. G. Pease, D. W. Brown, H. R. Brown, E. E. Shumway, all of Central City.

Crown Creek Alaska Hydraulic Gold Mining Co., Denver. Mining business. Capital, \$300,000. Incorporators: E. L. Campbell, J. S. Spitman, J. B. Fehan, all of Denver.

Mary Cashen Mining Co., Colorado Springs. Mining business. Capital, \$1,500,000. Incorporators: C. Edsall, J. P. Sweeney, J. P. Pomeroy, B. B. Wagener, W. T. Bland, all of Colorado Springs.

Silver Supply Co., Silverton. Mining and miners' supply business. Capital, \$50,000. Incorporators: S. T. Annear, W. W. Gremes, T. P. Neeley, all of Silverton.

Tarshish Mining & Leasing Co., Leadville Mining and leasing. Capital, \$500,000. Incorporators: T. P. Mitchell, C. Hayden, F. K. Porter, all of Leadville.

Olympia Gold Mining & Milling Co., Colorado

Mining business. Capital, \$1,350,000. Incorporators: D. H. Waite, D. H. Bruce, W. O. Temple, all of Colorado Springs.

Anglo-Dutch Mining Co., St. Louis, Mo. Mining business. Capital, \$200,000. Incorporators: N. Garstin, P. A. Garstin, D. Ramsey, all of Colorado Springs; A. T. Wyers, of St. Louis, Mo.

Eagle Mining & Investment Co., Colorado Springs. Mining and investing. Capital, \$1,250,000.

Magnolia Gold Mining Co., Colorado Springs. General Mining business. Capital, \$1,250,000. Incorporators: A. B. Moulder, N. S. Gandy, S. R. Bartlett, W. E. Frinago, all of Colorado Springs.

Southern Bay Gold Mining Co., Colorado Springs. General mining business. Capital, \$1,250,000. Incorporators: A. L. Shepherd, H. M. Blackmer, R. P. Davis, N. G. Gandy, A. J. Bendale, all of Colorado Springs.

#### DELAWARE.

Green Mountain Copper Co. General mining business. Capital, \$50,000. Incorporators: E. A. Haggott, of Yavapai County, Arizona; W. B. Clark, G. W. Roberts, of Wilmington.

#### ILLINOIS.

Sterling Lead & Zinc Mining Co., Chicago. Mining and smelting business. Capital, \$5,000. Incorporators: T. F. Mullen, H. W. Lewis, J. M. Cameron, all of Chicago.

#### MAINE.

Oneida Copper Co., Portland. Mining business. Capital, \$2,500,000. Incorporators: A. E. Elliott, of Gloucester; H. L. Baker, of Boston, Mass.; B. A. Longridge, of Boulder, Col.; H. C. Farr, A. C. Chapman, both of Portland.

Rock Creek Gold Mining Co., Pittsfield. Mining business. Capital, \$1,000,000. Incorporators: G. H. Ash, of Boston, Mass.; E. D. Smith, G. H. Morse, both of Pittsfield, Me.

#### MINNESOTA.

Paragon Mining & Manufacturing Co., St. Paul. General mining business. Capital, \$100,000. Incorporators: G. P. Sandberg, G. S. Monson, F. C. Hammer, M. A. Beckman, R. H. Ames, all of St. Paul.

#### MISSOURI.

Big Hickory Mining Co., Kansas City. General mining business. Incorporators: F. D. Crabbs, F. A. Doggett, W. C. Root, T. Gowdy, C. E. Hochstettler, T. Bishop, J. D. Seitz, all of Kansas City, and others.

Regent Lead & Zinc Mining Co., St. Louis. General mining business. Capital, \$60,000. Incorporators: C. E. Carroll, W. Keightley, A. R. Schollmeyer, J. L. Ennis, S. B. Parsons, A. H. Kallas, A. R. Schollmeyer, Sr., all of St. Louis.

Cadmus Mining Co., Joplin. General mining business. Capital, \$37,500. Incorporators: D. A. Gault, W. E. Aaron, R. R. Armor, all of Joplin; A. L. Fuller, E. T. Holmes, G. E. Terrell, S. R. Kerrnisk, all of Cleveland, O.

Robert N. Denham Mining Co., St. Louis. General mining business. Capital, \$50,000. Incorporators: R. N. Denham, O. B. Givens, both of St. Louis; J. B. W. Amsden, of Joplin.

#### NEW JERSEY.

Alma Bessemer Ore Mining Co., of New Jersey. Principal office, No. 76 Montgomery street, Jersey City. Mining capital, \$100,000. Incorporators: Alfred C. P. Quimby, John T. Rowland, Jr., William J. Ball, all of Jersey City.

Overleigh Zinc Mining Co.—Principal office, No. 106 Market street, Camden, N. J. Mining capital, \$50,000. Incorporators: William H. Greene, Samuel W. Cooper, Charles B. Adamson, all of Philadelphia.

California Lithia Mining Co.—Principal office, Corporation Trust Co. Building, Jersey City, N. J. Mining, etc. Capital, \$500,000. Incorporators: Charles O. Maas, Fred. A. Hoffman, Harry D. Paton.

Arnold Leasing & Mining Co.—Principal office, New Jersey Registration & Trust Co.'s Building, East Orange, N. J. Mining capital, \$250,000. Incorporators: Walter Whittlesey, Albert N. Parlin, S. G. Collins.

#### PENNSYLVANIA.

Gallitzin Coal & Coke Co., Philadelphia. Manufacturing and sale of coal and coke. Capital, \$50,000. Incorporators: J. L. Mitchell, W. S. Pilling, T. Crane, C. Berg, J. A. Jardine, all of Philadelphia.

Mingo Coal Co., Pittsburg. Mining and sale of coal and coke. Capital, \$1,000. Incorporators: R. T. Rossell, J. H. Beal, G. E. Shaw, J. C. Bily, G. B. Motheral, all of Pittsburg.

Brinker Coal & Iron Co., Dutch Hall. Mining and sale of coal and iron. Capital, \$50,000. Incorporators: G. Mellinger, L. Mellinger, both of Renoldsville; H. R. Wilson, of Clarion, Pa.; E. T. Brinker, W. S. Pitman, both of Buffalo.

Whimo Lead & Zinc Co., Cleveland. Mining and smelting business. Capital, \$50,000. Incorporators: F. R. White, J. D. Clinn, C. A. Post, D. F. Shorbondy, H. H. Johnston.

National Mining Co., Pittsburg. Mining and sale of coal and coke. Capital, \$1,000. Incorporators: R. T. Rossell, J. H. Beal, G. E. Shaw, J. C. Bily, G. B. Motheral, all of Pittsburg.

#### RHODE ISLAND.

Glen Almond Mica & Mining Co., Providence. General mining business. Capital, \$100,000. Incorporators: F. S. Shirley, J. P. Burlingame, C. N. Snow, all of Providence; A. L. Mason, of Newport.

#### WEST VIRGINIA.

California Quicksilver Mines Co., Boston Mass. General mining and milling business. Capital, \$750,000. Incorporators: H. E. Pearson, of Newburg; R. A. Atwood, C. W. Smith, A. P. French, all of Boston, Mass.; T. O. Potter, of Denver, Col.

Narragansett Gold Mining Co., Boston, Mass. General mining business. Capital, \$1,000,000. Incorporators: E. E. Kent, F. E. Tuttle, C. C. Corbett, of Boston; R. S. Whitcomb, of Malden, Mass.; E. P. Bellows, of Groversville.

South American Land & Exploration Co., Ltd., New York City. Mining and milling business. Capital, \$5,000,000. Incorporators: F. C. Nicholas, of Summit; F. N. Whitney, of Elizabeth, N. J.; H. S. Byrne, of Yonkers; G. S. Bixby, L. E. Carr, both of New York City.

Red Bird Gold Mining Co., Salmon City. General mining and milling business. Capital, \$500,000. Incorporators: W. E. Carter, R. E. Dwight, E. W. Burdick, T. A. Callaghan, C. H. Fowler, all of New York City.

#### WYOMING.

Calumet Mining, Milling & Smelting Co., Encampment. General mining business. Capital \$500,000. Incorporators: E. C. Perisho, L. Vanderbee, Jr., both of Platteville, Wis.; E. M. Benson, T. H. Andrew, all of Denver, Col.

Colorado-Wyoming Copper Mining Co., Encampment. Mining business. Capital, \$1,000,000.

First Quality in all Lines

# Mining Machinery and Supplies



STEAM

ENGINES  
HOISTS  
PUMPS  
BOILERS

GASOLINE

ENGINES  
HOISTS  
AIR COMPRESSORS  
PUMPING PLANTS

Our Combined Geared Gasoline Engine and Hoist, and Combined Gasoline Engine and Air Compressor Especially adapted for Mining Purposes.

Fairbanks' Standard Scales,

Fairbanks, Morse & Co.,

Mining Cars,  
Spiral Riveted Pipe,  
Car Wheels,  
Pipe and Fittings,

Chicago, Cleveland, Cincinnati, Louisville, Indianapolis, St. Paul,  
Minneapolis, St. Louis, Kansas City, Omaha, Denver, San Francisco,  
Los Angeles, Portland, Oregon.

# The Mining And Metallurgical Journal

## THE MARKETS.

All quotations, financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue, and constitute a very accurate compilation of statistical matter.

### METALS.

The following are the Silver, Copper and Lead quotations for the last two weeks:

	SILVER.	COPPER.	LEAD
Dec. 1	58½	17 00	4 60
" 2	58½	17 00	4 60
" 4	58½	17 00	4 62½
" 5	58½	17 00	4 62½
" 6	58½	17 00	4 65
" 7	59½	17 00	4 65
" 8	59	17 00	4 70
" 9	59	17 00	4 70
" 11	59½	17 00	4 75
" 12	58½	17 00	4 75
" 13	58½	17 00	4 80
" 14	58½	17 00	4 80

### SILVER.

The Silver market has been steady and dull showing only small fractional changes during the week and closing at 26% d. in London.

### COPPER.

Prices remain unchanged from those quoted last week. Lake copper 18½, Electrolytic in cakes, wirebars and Ingots 17 @ 17½, Cathode 16½ @ 16½c, casting copper 17c nominal. The foreign market is still dominated by difficulties betw. England and Transvaal. London

is quoted, English tough £78, 15s @ £79 5s, best selected £80 5s @ £80 15s. India sheets £83@£83 10s.

### LEAD.

Lead continues in good demand and with no change in prices. New York being quoted at 4.55@4.60c.

The foreign market has been irregular but the tendency is upwards. Spot is quoted at £15 17s 6d @ £16 2s 6d for Spanish and £16 5s@£16 7s 6d for English, while futures are at a discount of 5s to 10s.

### SPELTER.

The disquieting news from the ore-fields stirred up consumers and a good business has resulted at stiffening prices. New York is quoted at 5.45@5.50.

The foreign market is also firmer and again higher good ordinarys being quoted at £22 12 6d, Specials £22 17s 6d.

### ANTIMONY.

Antimony is in good demand. We quote Cooksons at 10½@11c, Hallett's at 9½@9½c, U. S. Star and Hungarian 7½@9½c.

### NICKEL.

Nickel continues unchanged and no alteration of prices can be reported. We quote for ton lots 33@36c per lb., and for smaller orders 35½@38c. London prices are 14@16d. per lb., according to size of order.

### TIN.

It is quite natural that this article, which is always volatile should suffer in consequence of the unsettled state of affairs abroad and the higher money market. Fluctuations have been rather wide but the close is again firm at £145 15s for spot and £146 2s 6d for three months.

In New York the buying was restricted

to quantities needed to cover immediate requirements although consumption continues at a fair rate. We quote Straits in carload lots at 32½c f. o. b. New York.

### PLATINUM.

The demand for Platinum is good and prices are firmer. New York is quoted \$17.75 per ounce for large lots and \$18 for smaller orders.

### POTASSIUM CYANIDE.

Purified, 98@99 per cent., in cases of 120 lb. at 30c. per lb. in 5, 10, 25 and 50 lb tins at an advance.

### QUICKSILVER.

The wholesale price in New York has advanced \$1 and is now \$48.00 per flask. The London price has risen to £8 17s 6d per flask, with the same rate from second hands.

### THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:	
No. 1, 99 per cent. ingots, per lb.	35@37c
No. 2, 99 " " " "	31@34c
Rolled sheets, per lb.	38c. up
Aluminum—Nickel, per lb.	33@39c
Alum. bronze.	20@23c
Bismuth, per lb.	\$1.45@\$1.50
Phosphorus, per lb.	48@50c
Magnesium.	\$2.75@3.00
Tungsten, per lb.	70c
Ferro-tungsten, 60 per cent.	60c

Variations in price depend chiefly on the size of the order.

### ACIDS.

Acetic is in good request, muriatic is moving briskly on contract, and sulphuric is unchanged. Blue vitriol is quiet. Only 50 bbls. oxalic acid were imported this week.

The exports from the United States in August amounted to \$12,653.

### BRIMSTONE.

There are no arrivals. Spot best unmixed second \$22@\$22.50 per ton and shipments \$21.15; thirds, \$19. The imports of brimstone into the United States in August were 11,109 tons.

### NITRATE OF SODA.

Demand is very quiet and quotations for all positions are nominally \$1.65 per 100 lbs. Odd lots can doubtless be had at \$1.62½. The United States imported 18,708 tons nitrate of soda in August.

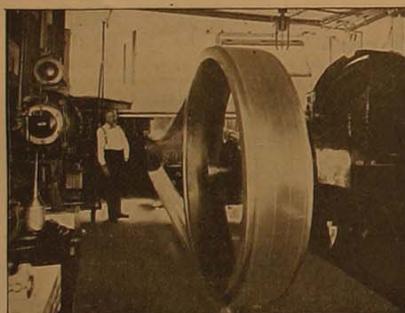
### CHEMICALS.

Most of the business done in heavy chemicals is for future delivery, the little doing on spot being at advanced prices. Imports this week included 200 drums, 210 casks and 2 bbls. bleaching powder. Importers expect a curtailment of shipments from England when the Boer war is on, as the merchant vessels will be used for transporting troops to South Africa. Receipts of domestic goods at New York last week included 1055 sacks alkali and 250 drums caustic soda.

Caustic soda high test is quoted per 100 lbs. f. o. b. works at 1.77½@1.82½; in New York, \$1.85@\$1.90. Bi-carbonate of soda is quoted per 100 lbs. f. o. b. works, \$1.12½ @ \$1.25. Chlorate of potash crystals in New York are quoted for domestic, \$8.75@9.00; foreign, \$9.25@9.37½; powdered domestic at \$9.25@9.50, and foreign, 9.50@9.75.

### CHLORIDE OF LIME.

English prime brands are quoted at 1.65@1.75 with 1.50@1.60 for other brands.



BROWN, DURRELL & CO.

CLING-SURFACE MFG. CO.,  
BUFFALO, N. Y.

DEAR SIR.—Having tried Cling-Surface on my 12" dynamo belt (16 feet between centres), I have been able to carry full load with 22" sag on belt with no perceptible slip. It surpasses my expectations and I can recommend it to do all that is claimed for it, if directions are followed.

E. B. PRESCOTT, Engineer.

FOUR  
MONTHS  
AGO

this Belt was as tight as a fiddle string, under about 1000 lbs. initial tension and yet was slipping. There is no slip now for it runs slack. CLING-SURFACE did it.

### CLING-SURFACE MANF. CO.,

167-172 VIRGINIA ST., BUFFALO N. Y.

Represented in Salt Lake City by the UTAH RUBBER & MANF. CO.

Patent Pending

### Perfect Cupels

Can be made by anyone with ease and dis-  
patch with

### Calkins' Cupel Machines

Compact, easily operated, can't get out of  
order, everlasting.

No Assay Office Complete without one.

Descriptive pamphlet and price list mailed on  
application.

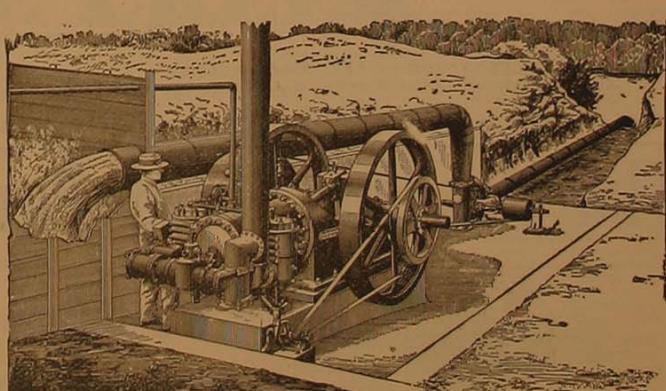
F. W. BRAUN & CO., Assayers Goods of every  
Description.

LOS ANGELES, CAL.

The Automatic. This machine will make  
five sizes cupels of ideal perfection.  
Capacity 600 an hour. Three designs  
and grades.

RIVETED SHEET STEEL WATER PIPE  
For Placers, Water Powers, Irrigation, Etc.

THE WEIGELE PIPE WORKS  
2949-51 Larimer St. DENVER, COLO.



### THE LARGEST GASOLINE PUMPING PLANT IN THE WORLD

The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works on the Packer Ranch, Colusa Co., 80 h. p. Hercules Engine, pumping 7200 gallons a minute, 27 feet high. Burns Gasoline or Distillate oil. Cheapest power known. Gas, Gasoline and Oil Engines, 2 to 200 h. p. Send for Catalogue. HERCULES GAS ENGINE WORKS, #10 Bay St., San Francisco.

## FINANCIAL NOTES.

AVERAGE PRICES OF METALS.  
in New York per 100 lbs. from January 1st, 1899:

Month	Copper	Tin	Lead	Spelter
January	14.75	22.48	4.18	5.34
February	18.50	24.20	4.49	6.28
March	17.54	23.89	4.37	6.31
April	18.45	24.98	4.31	6.27
May	18.45	25.76	4.44	6.88
June	18.93	25.75	4.12	5.98
July	18.33	20.63	4.32	5.82
August	18.50	21.53	4.57	5.65
September	18.46	22.74	4.58	5.59
October				
November				
December				
Average				

## AVERAGE MONTHLY PRICES OF SILVER.

In New York per ounce Troy, from January 1st, 1899, and for the years 1883 and 1897:

Month	1899	1898	1897
	Cents.	Cents.	Cents.
January	69.86	66.77	64.79
February	69.52	66.47	64.67
March	69.64	64.90	63.08
April	60.10	66.02	61.85
May	61.23	66.98	60.42
June	60.43	58.61	60.10
July	60.26	59.06	59.61
August	60.00	59.54	54.19
September	58.89	60.68	55.24
October	—	60.42	57.87
November	—	60.60	57.91
December	59.42	58.01	—
Year	—	58.26	59.79

## MONEY IN CIRCULATION.

Comparative statement of the circulation in the United States on Oct. 1st 1899. Comparison being made with statement on September 1st, 1899.

October 1.	Changes
Gold	\$64,561,185 D. \$26,372,007
Silver	142,301,005 L. 5,395,932
Legal Tenders	314,954,600 L. 4,524,179
Treasury & N.Y. Bk Notes	329,088,956 D. 483,165
Totals	\$1,434,014,746 D. \$16,634,061

Gold and Silver certificates and currency are not included in this table. By adding the amounts given in this table

with those in the following will give the total amount coined or issued. The figures herewith are furnished by the Bureau of Statistics Treasury Department.

## MONEY IN TREASURY.

Comparative statement of changes of money in United States Treasury on Oct. 1st 1899, comparison being made with statement on Sept. 1st, 1899.

October 1.	Changes
Gold	\$122,271,089 L. \$31,385,245
Silver	415,844,704 D. 4,659,483
Legal Tenders	31,726,416 L. 4,824,179
Treasury & N.Y. Bk Notes	4,830,547 L. \$32,491

Totals \$673,693,556 L. \$163,057

The Gold and Silver bullion on hand in the Treasury is not included in this statement.

## GOLD AND SILVER EXPORTS AND IMPORTS.

At all United States ports, for the month of September, 1899, and 9 months ending September, 1898, and 1899:

SEPTEMBER.	1898	1899
Gold—		
Exports	\$3,102,810	\$618,995
Imports	16,888,341	2,593,594
Excess	L. \$13,795,531	L. \$1,974,599
Silver—		
Exports	\$5,152,103	\$3,622,041
Imports	2,000,696	2,376,846
Excess	L. \$3,151,407	L. \$1,245,195

NINE MONTHS ENDING AUGUST.

Gold—	1898	1899
Exports	\$12,781,023	\$12,877,839
Imports	127,343,816	34,268,421
Excess	L. \$114,561,893	L. \$1,390,583
Silver—		
Exports	\$39,431,500	\$8,738,431
Imports	21,099,224	22,724,095
Excess	L. \$18,334,276	L. \$16,014,336

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

## The Cleveland Mining and Stock Exchange Co.

New England Building, Cleveland, Ohio.

A Reliable Information Bureau for Miners and Investors to obtain FACTS Regarding Capital and Mines. Stocks and Mines listed. Send for prospectus.

## Morgan-Watson Mining and Construction Co.

809-810 New England Building, Cleveland, Ohio

MINES AND STOCKS  
We Buy, Sell, Lease and Bond Mines of all kinds  
We Buy, Sell, and Negotiate sales of mining and other stocks.  
We Furnish Machinery to work good mines under special arrangement.  
We Furnish Capital to develop mines.

JAMES IRVING & CO.  
REFINERS

Largest and most complete establishment in Southern California Cyanide and Mill Test.

128 N. Main Street (Old Location.) Los Angeles, Cal.

W. O. ABBOTT, ASSAYER . . .

ASSAYING IN ALL ITS BRANCHES  
CHEMICAL DETERMINATIONS ACCURATELY MADE

TOMBSTONE - - - -

ARIZONA

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

— - - -

## MINING STOCK QUOTATIONS

BOSTON		
Adventure	6 13	Mass
Aetna	4 63	Meticed
Allouez	—	Mohawk
Anaconda	49 50	Napa
Arcadian	50 00	Old Colony Con
Arnold	10 75	Old Dominion
Atlantic	28 75	Orion
Baltic	21 00	Parrott
Bingham	15 25	Pioneer
Bonanza	1 63	Quincy
Boston & Mont's	35 00	Rhode Island
Breeze	2 50	Santa Fe
Butte & Boston	78 00	Santa Ysabel
Calumet & Hecla	78 00	Tamarack
Catalpa	40	Tecumseh
Centennial	32 50	Tri-Mountain
Cochiti	17 00	Victor
Copper Range	37 00	Victoria
Crescent	—	United States
Domion Pref.	—	Utah Con
Forsyth	7 75	Washington Ming
Gold Dredging	—	White Knob
Humboldt	1 75	Winona
Isle Royale	44 00	Wolverine
Melones	2 50	Wyanotte

## ROSSLAND, BRITISH COLUMBIA.

Brand'n & G'dr'c	28	Kootenay Gold F.
Burns'ner. Cor.	—	Lerwick
Brit. Col. Dev. Co.	—	Lily N.
Canad. G'dl Fields	07 1/2	Loc. & Van M. D. Co.
Carribou	1 18 1/2	London R. C. G. F. 7
Commander	—	Monte Cristo
Deer Park	04	New G'dl'ld's R. C. 5
Dundee	19	Novelt
Evening Star	09	Queen Bess Prop. 5 50
Fern	28	Rambler-Caribon.
Gold Fields of B.C.	—	Red Mount, View.
Hattie Brown	—	Reco
Hall Mines	—	Silver Bell
Homestake	—	Silver Queen
Iron Horse	06	St. Elmo
Iron Mask	76	Slocan Star
Josie	—	Vic. Tr. M. Dev. Co.
Jumbo	25	Waverly Mines
Kenneth	—	War Eagle Con.
Keystone	—	White Bear....

## SAN FRANCISCO.

Alta	04	Mexican
Andes	10	Occidental
Belcher	33	Ophir
Best & Belcher	35	Overman
Bullion	04	Ontario
Caledonia	70	Plymouth
Challenge	20	Potosi
Chollar	31	Quicksilver
Confidence	80	Quicksilver pref
Con. Cal. & Va.	1 65	Savannah
Crown Point	15	Sieg. Belcher.
Deadwood	—	Sierra Nevada

CLARENCE HERSEY,  
Assayer and Chemist,

(Established 1879)

LEADVILLE, COLORADO

Samples by Mail or Express Re-  
ceive Prompt Attention

## SPECIMEN ASSAY PRICES:

Gold silver and lead, \$1.00; any two of the  
above, 75c; any one of above, 50c; copper analy-  
sis, \$1; platinum, nickel or tin, \$5.00.  
Write for full price list and mailing envelopes

## THE MINING AND METALLURGICAL JOURNAL.

		NEW YORK.
Gould & Curry	35	Silver Hill
Hale & Norcross	37	Standard
Homestake	—	Union Con
Iron Silver	—	Utah
Justice	—	Yellow Jacket

		NEW YORK.
Adams Con	12	Isabella
Alamo	10	Iron Silver
Alice	60	Jefferson
Alliance	—	Jennie Blanche
Anaconda Copper	40	Jasmine
Anaconda Gold	44 1/2	King & Pemb
Anchoria L	69	Leadville Cons.
Argentum Junia	24	Little Chief
Argentum Junia	24	Mexican
Best & Belcher	43	Mollie Gibson
Belle	65	Mt. Rosa
Breeze	1 65	Occidental
Brunswick	27	Ontario
Chollar	35	Ophir
Chrysolite	—	Pharmacist
Comstock Tunnel	04	Phoenix
Comstock Stocks	04	Plymouth
Comstock Script.	04	Portland
Con. Cal. & Va.	1 75	Potosi
Cr. & Cr. Creek	11	Quicksilver
Crescent	16	Quicksilver pf
Crown Point	15	Ranier Mountain
Cripple Creek Con	18	San Juan Star
Diamond Terra	70	Savage
El Paso	1 10	Sierra Nevada
Enterprise	25	Small Hope
Good Samaritan	—	Specimen
Gold Coin C. Cr. C.	2 10	Standard Con.
Gold Coin Gilpin	27	Syndicate
Gold Fleece	27	Union Con
Golden Fleece	30	Union Gold
Gold King	30	Vindicator
Hale & Norcross	30	High Five
Homestake	65 00	Work
Horn Silver	1 25	Yellow Jacket

		NEW YORK.
Bob Lee	08 1/2	Old Gold
Elkton	1 17	Peoples
El Paso	4 1/2	Pilgrim
Enterprise	17 1/2	Pine Creek
Fanny B	0045	Portland
Garfield	15 1/2	Prince Albert
Geo. Washington	—	Republ
Golden Eagle	—	Sacramento
Gold Con.	2 10	Smuggler
Gold & C. C.	—	Specimen
Gilpin Four	26	Tarack
Golden Fleece	18	Union
Isabella	91 1/2	Virginia M.
Iron Clad	06 1/2	Wheels Cons.
Jack Pot	85	Work

		MEXICO
Name of Company	State	Price

|--|--|--|

## COLORADO SPRINGS STOCKS

		SALT LAKE CITY
Anchor	50	Joe Bowers Ex.
Ajax	98	La Reine
Alliance	—	Lower Mammoth
Alice	40	Little Pittsburg
Bullion Beck	3 05	Mammoth
Buckeye	—	Mercur
Cent. Eureka	68	May Day
Cent. Nevada	25	Mountain Light
Coloride Point	25	Northern Light
Corporor	26	North Swansea
Daly	1 41	Omaha
Daly West	12 73	Ontario
Dalton & Lark	03	Petro
Dalton	01	Rich. Anconda.
Dexter	2 45	Sunshine
Daisy	19 1/2	Swansea
Eagle	03 3/8	Swansea
Eagle & Blue Bell	1 45	Sunbeam
Emerald	12	Sacramento
Four Aces	13 1/2	Silver King
Geyser Marion	34	Star Consolidated
Galena	30	Silver Con
Grand Central	6 05	Tetons
Golden Eagle	60	Utah
Hill Silver	1 17 1/2	Valeo
Homestake	04 1/2	West M't'n Pl'cer
Ingots	09	Yankee Con.
Joc Bowers	17	—

## SPOKANE, WASHINGTON.

		SPOKANE, WASHINGTON.
Ben Hur	15	Mountain Lion
Black Tail	14	Morrison
Butte and Boston	05 1/2	Number Six
Caribou	—	Pearl
Caribou Trail	22	Passage Maude
Golden Harvest	04	Quill
Insurgent	04	Rebate
Iron Monitor	—	Republ
Jim Blaine	31	San Poll
Liberty	29	Tom Thumb
L Pine Surf. Con	23	Winnipeg
Morning Glory	11 1/2	—
Atena	—	Keystone
Anchuria Leland	70	Lillie
Anaconda	44 50	Mt. Matoa
Argentum Junia	25 1/2	Mollie Gibson
Argentum Junia	25 1/2	Mt. Rosa
Banner	04 1/2	—

## DENVER STOCK REPORT.

		DENVER STOCK REPORT.
Atena	—	Keystone
Anchuria Leland	70	Lillie
Anaconda	44 50	Matoa
Argentum Junia	25 1/2	Mollie Gibson
Argentum Junia	25 1/2	Mt. Rosa

NOTE.—The above Mexican stocks are figured on the basis of Mexican silver

ADOLF FRESE  
Maker and Repairer

of Transits, Levels and all other instruments used in mining. Fine assorted stock of Keuffel and Esser goods. Also Microscopes, Barometers, Field Glasses, Thermometers, Hydrometers, etc.

126 S. SPRING STREET

Los Angeles, California

SELLS

LUMBER

At Wholesale Prices

Mining Timbers a Specialty

Write for Prices

## FROM CRIPPLE CREEK

AIR COMPRESSORS  
ROCK DRILLS,  
Stone Channelers,  
The Pohle Air Lift Pump,  
Coal Cutters,

THE INGERSOLL-SERGEANT DRILL COMPANY, HAVEMEYER BUILD'G  
NEW YORK  
PARKE & LACY CO., AGENTS, SAN FRANCISCO, CAL.

JAMES F. BURNS, Pres't. JOHN HARNAN, Gen. M'n.

FRANK O. BECK, Sec'y and Treas.

THE PORTLAND GOLD MINING CO.,

(Stock Transfer Office, Colorado Springs.)

Mines at Victor, Colorado.

COLORADO SPRINGS, CO., May 19, 1898

The Ingersoll-Sergeant Drill Co.,

Gentlemen:—We bought two years ago one of the straight line type of Ingersoll-Sergeant Piston

Inlet Compressor.

This was found to be too small for our needs about a year ago and we purchased of you a Duplex Corliss machine

10" x 18 1/2" x 21".

This was set in place in our shaft house in the Cripple Creek District, 10,000 feet above the level of the sea, and has been running continuously ever since, and at times over in 3 1/2" Eclipse drills. The steam cylinders were connected to an independent Jet Condenser, for which we are using the mine water, and the resultant economy of operation is very noticeable.

The operation of this Compressor is as near perfect as that of any machine we have ever seen, and this type is well worth the extra cost on account of the great permanent economy in operation.

Our mine is equipped exclusively with your drills and we have only the highest words of praise to give them.

Yours very truly, THE PORTLAND GOLD MINING CO.,

Jas. A. Burns, President

## INCORPORATED MINES PAYING DIVIDENDS.

NAME OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Minerals Produced
1 Aetna Cons.	California	100,000	500,000	\$ 5	\$ 10	Oct 1899	\$ 195,000	Q.
2 Alamo	Utah	125,000	125,000	1	2	April 1899	2,500	G, C, I.
3 Alaska, Treadwell	Alaska	200,000	5,000,000	25	37½	July 1899	4,145,000	G.
4 Alaska Mexican	Alaska	200,000	1,000,000	5	10	July 1899	411,031	G.
5 Anaconda Copper	Montana	1,200,000	30,000,000	25	2 00	Nov 1899	12,150,000	C.
6 Anchoria Leland	Colorado	600,000	600,000	1	03	Apr 1899	198,000	
7 American Gold	Colorado	300,000	3,000,000	10	09	June 1899	484,000	G. S. L.
8 American Coal	Maryland	60,000	1,500,000	25	1 25	Sept 1899	727,500	Coal
9 American Zinc, Lead and Smelting	Missouri	200,000	500,000	25	10	Oct 1899	40,000	Z. L.
10 Aurora	Michigan	100,000	2,500,000	25	50	June 1899	890,000	L.
11 Argonaut	California	200,000	2,000,000	10	10	Aug 1899	340,000	
12 Bald Butte	Montana	250,000	250,000	1	06	Sept 1899	747,141	G. C. S.
13 Bonanza Development	New Mexico	300,000	8,000,000	10	3 50	June 1899	1,500,000	
14 Boston & California	California	600,000	600,000	1	06	June 1899	72,000	
15 Boston and Colorado Smelting	Colorado	15,000	750,000	50	5 00	April 1899	375,000	
16 Boston & Montana Con.	Montana	150,000	3,750,000	25	10 00	Aug 1899	12,275,000	G. C. S.
17 Breeo	Colorado	200,000	5,000,000	25	05	Sept 1899	60,000	L.
18 Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Sept 1899	2,408,400	G. S.
19 Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	May 1899	705,000	S. L.
20 Cariboo	British Col	800,000	800,000	1	01½	Feb 1899	248,965	G.
21 Calumet & Hecla	Michigan	10,000	2,500,000	25	20 00	Sept 1899	64,850,000	C.
22 Centennial Eureka	Utah	30,000	1,500,000	50	50	Aug 1899	2,150,000	S. L.
23 Central Lead	Missouri	10,000	1,000,000	100	50	Sept 1899	127,000	L.
24 Charleston	S. Carolina	10,000	1,000,000	100	2 00	June 1899	200,000	
25 Colorado Smelting	Montana	100,000	1,000,000	10	1 00	Jan 1899	1,945,000	G. S. C.
26 Consolidated Tiger and Poorman	Idaho	1,000,000	1,000,000	1	02	Dec 1898	20,000	G. S.
27 Creston Leasing	Colorado	1,000,000	1,000,000	1	01	Dec 1898	54,00	
28 Crowned King	Arizona	600,000	6,000,000	10	02	Dec 1898	232,000	G. S. L.
29 De Lamar	Idaho	400,000	2,000,000	5	12	May 1899	2,346,000	G. S.
30 Deer Trail No 2	Washington	1,000,000	1,000,000	1	25	Sept 1899	40,000	
31 Doe Run	Missouri	5,000	500,000	100	50	Sept 1899	85,000	L.
32 Empire State Idaho	Idaho	75,000	750,000	10	30	Sept 1899	229,375	
33 Fanny Rawlings	Colorado	1,000,000	1,000,000	1	01	Aug 1899	20,000	G. S.
34 Ferris-Haggerty	Wyoming	1,000,000	1,000,000	1	00½	Mar 1899	5,000	C. G. S.
35 Garfield Consolidated	Colorado	1,200,000	1,200,000	1	01	May 1899	34,000	G.
36 Golden Star	Ontario, Canada	100,000	100,000	1	01	July 1899	41,000	
37 Gold Coin of Victor	Colorado	1,000,000	1,000,000	1	01	Sept 1899	240,000	G.
38 Gold King	Colorado	1,000,000	1,000,000	1	03	July 1899	60,000	G.
39 Golden Cycle	Colorado	200,000	1,000,000	5	05	Sept 1899	228,500	
40 Grand Central	Utah	250,000	250,000	1	24	Sept 1899	668,250	G. S. C. L.
41 Gwin	California	20,000	1,000,000	50	25	Aug 1899	81,500	G.
42 Grass Valley Exploration	California	50,000	100,000	2	25	July 1899	12,500	
43 Helena and Frisco	Idaho	500,000	2,500,000	5	25	June 1899	550,000	S. L.
44 Highland	S. Dakota	100,000	10,000,000	100	20	July 1899	3,924,718	G.
45 Holy Terror	S. Dakota	300,000	300,000	1	01	July 1899	142,000	G.
46 Homestake	S. Dakota	125,000	12,500,000	100	50	Sept 1899	7,828,750	G.
47 Horn Silver	Utah	400,000	10,000,000	25	05	July 1899	5,270,000	S. L.
48 Idaho	British Col	500,000	500,000	1	05½	Jan 1899	202,000	
49 Isabella	Colorado	2,250,000	2,250,000	1	01	Sept 1899	472,500	G.
50 Jack Pot	Colorado	1,000,000	1,000,000	1	04	Sept 1899	75,000	G.
51 Jamison	California	390,000	3,900,000	10	10	April 1899	50,700	
52 Lake Superior Iron	Michigan	84,000	2,100,000	25	1 00	Feb 1899	736,000	L.
53 Lillie	Colorado	1,000,000	1,000,000	1	05	Sept 1899	279,110	G.
54 Modoc	Colorado	500,000	500,000	1	02	Sept 1899	170,000	G.
55 Montana Ltd	Montana	660,000	3,300,000	5	12	Apr 1899	2,997,557	G. S.
56 Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	Sept 1899	1,280,000	
57 Morning Star	California	2,400	240,000	100	3 00	Sept 1899	744,600	G.
58 Mercur	Utah	200,000	5,000,000	25	12½	July 1899	1,291,000	G.
59 Mammoth	Utah	400,000	10,000,000	25	15	Sept 1899	1,530,000	G. S. C. L.
60 Mead	California	2,000,000	2,000,000	1	20	June 1899	120,000	G.
61 Monument	Colorado	300,000	300,000	1	01	Dec 1898	12,624	
62 Moulton	Montana	400,000	2,000,000	5	05	Feb 1899	480,000	
63 Mt. Shasta	California	20,000	100,000	5	30	May 1899	8,000	
64 New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	Sept 1899	1,110,000	S. G.
65 Napa Cons	California	100,000	700,000	7	30	Oct 1899	1,040,000	Q.
66 New Idria Quicksilver	California	100,000	500,000	5	30	Oct 1899	170,000	Q.
67 North Star	California	200,000	2,000,000	10	25	Apr 1899	550,000	G.
68 Original Empire	California	50,000	5,000,000	100	1 00	May 1899	500,000	G.
69 Osceola	Michigan	50,000	1,250,000	25	3 00	June 1899	2,801,500	C.
70 Parrot	Montana	230,000	2,300,000	10	1 50	May 1899	2,600,898	C.
71 Pennsylvania Consolidated	California	51,500	5,150,000	10	20	Sept 1899	105,575	
72 Pioneer	California	100,000	1,000,000	10	12½	Mar 1899	62,500	G.
73 Portland	Colorado	3,000,000	3,000,000	1	02	Sept 1899	2,347,080	G. S.
74 Plumbago	California	300,000	300,000	1	15	Jan 1899	45,000	G.
75 Quicksilver Pref	California	43,000	4,300,000	100	50	May 1899	1,845,411	Q.
76 Quicksilver Consolidated	California	57,000	5,700,000	100	40	July 1899	643,867	Q.
77 Quincy	Michigan	100,000	2,500,000	25	6 00	August 1899	11,070,000	C.
78 *Republic Consolidated	Washington	3,000,000	3,000,000	1	01	Sept 1899	323,000	G.
79 Rambler-Cariboo	British Col	1,000,000	1,000,000	1	01	April 1899	50,000	
80 Royal Consolidated	British Col	2,500,000	2,500,000	1	01	June 1899	1,050,000	G.
81 Sacramento	Utah	1,000,000	5,000,000	5	00½	Sept 1899	133,000	G.
82 Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Feb 1899	3,325,000	S.
83 South Swansea	Utah	150,000	150,000	1	05	Sept 1899	150,000	S. L.
84 Standard	Idaho	500,000	500,000	1	06	Apr 1899	1,745,000	G. S.
85 Standard Consolidated	California	200,000	20,000,000	100	10	Aug 1899	3,879,226	G. S.
86 St. Joseph	Missouri	30,000	3,000,000	10	50	June 1899	2,859,500	L.
87 Silver King	Utah	150,000	3,000,000	20	25	Sept 1899	2,250,000	S. L. G.
88 Smuggler	Colorado	1,000,000	1,000,000	1	01	Sept 1899	1,185,000	S. L. Z.
89 Swansea	Utah	100,000	500,000	5	05	Oct 1899	241,000	S. L.
90 Tamarack	Michigan	60,000	1,500,000	15	4 00	June 1899	5,910,000	C.
91 Tomboy	Colorado	200,000	2,000,000	10	4 00	May 1899	730,000	G.
92 Utah	Utah	100,000	1,000,000	10	02	Jan 1899	179,000	G.
93 Vindicator Consolidated	Colorado	1,500,000	1,500,000	1	05	July 1899	253,750	G.
94 War Eagle Consolidated	British Col.	2,000,000	1,000,000	1	01½	Sept 1899	414,000	
95 Wolverine	Michigan	60,000	2,500,000	25	1 50	Oct 1899	270,000	C.
96 Yellow Aster	California	100,000	1,000,000	10	10	Sept 1899	263,789	G.

S. Silver; G. Gold; L. Lead; C. Copper; Q. Quicksilver; I. Iron Z. Zinc.

N. B.—Companies not listed paid nothing in the last twelve months. \*Paid since consolidation, \$203,000; Republic paid \$120,000 under old management.

# THE CAMMETT CONCENTRATOR

Designed with some Regar for the Laws of Concentration

The perfect vanner motion given to the pulp by our head motion together with the freedom from "jumping" resulting from the special rigid guides used, explains why the Cammett riffles never "pack," and why the table has such a great capacity when handling slimes.

The continuous grooves and riffles extending from end to end of the table maintains the greatest possible margin of safety between the concentrates discharge and the tailings.

Thoroughly protected by strong patents.

Write for Circular.

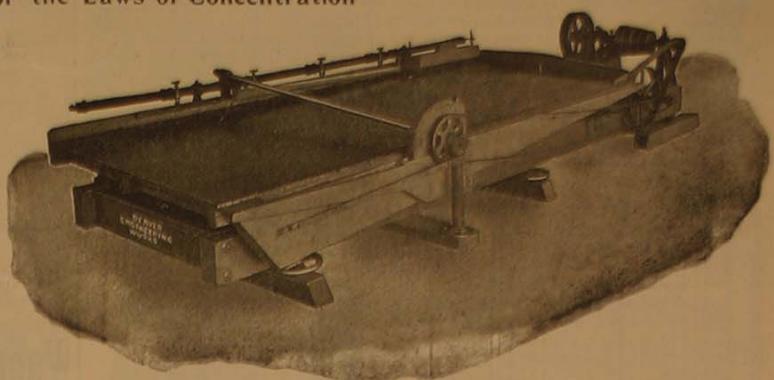
Denver Engineering Works,

Shepard & Searing,

Sole Manufacturers.

30th and Blake Sts.

Denver, Colorado.



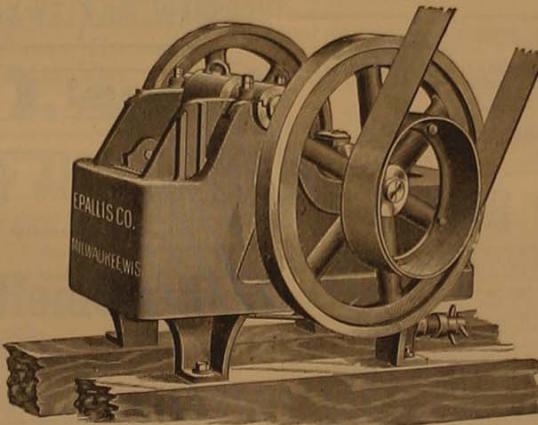
## Reliance Ore Crushers

(BLAKE STYLE)

Collom and  
Hartz Jigs

Hydraulic  
Classifiers

Reliance  
Vanner



Smelter  
Tools

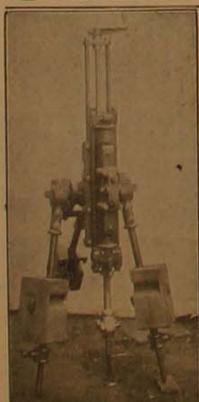
Hoisting  
Engines

Reynolds  
Corliss  
Engines

The Edward P. Allis Company,

Milwaukee, Wisconsin

## SULLIVAN ROCK DRILLS



Rapid, Strong, Convenient, For Mining, Shaft Sinking,  
and Tunneling

### SULLIVAN Diamond Prospecting Drills

Operated by Hand, Horse Power, Steam, Compressed Air  
and Electricity.

Contractors for Prospecting with the Diamond Drill.

SULLIVAN MACHINERY CO.,

Cable Address, Diamond, Chicago,  
Codes:  
A. B. C., 4th Edition.  
Postal Directory.  
Western Union.  
Liebers.

54 TO 60 NORTH CLINTON STREET  
CHICAGO, ILL., U.S.A.

AGENCIES—332 17th St., Denver, Colo.; Empire  
Building, 71 Broadway, New York; Henshaw-  
Bulkley & Co., San Francisco Cal.



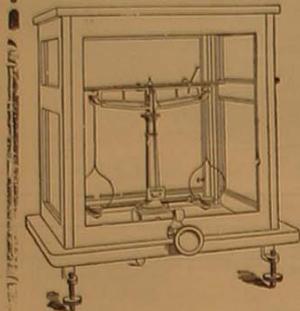


### The Detroit Lubricators in Good Company.

Fully 9-10ths of the prominent American engine builders use The Detroit Lubricators on their engines. They will not equip an expensive engine with an inferior or mediocre lubricator as their experience has taught that the risk is too great. This preference by those best qualified to judge of their merits is the best recommendation that could be given our goods. Our catalogue showing our different lubricators, glass and brass oilers, oil pumps, etc., will be sent on application.

DETROIT LUBRICATOR CO., Detroit, Mich.

### QUEEN NO. 4 ASSAY BALANCE



Aluminum Beam, Agate Knives and Planes Sensibility 1-100 mg. The Best Low-Price Assay Balance on the Market. Send for Circular.

QUEEN & CO., Optical and Scientific Instrument Works 1010 Chestnut Street, N. Y. Office, 59 Fifth Ave. Philadelphia

**WHY** Spend your money to buy new machinery to put on Un-  
proved Mines which may not be a success when you can avoid  
Pumps, Hoists, Shafting, Pulleys, Air-Compressors,  
Engines, Boilers and in fact any Machinery you need for a  
Mine or Mill, as good as new, at the

Denver Variety Machine Shops, THOS. CROW, Prop.

Write for Prices and Particulars.

### Assay Balances and Weights

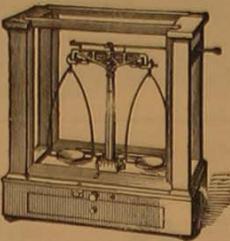
in use in all the U. S. Assay Offices in America

PRICE LIST ON APPLICATION

ESTABLISHED IN 1840

### HENRY TROEMNER,

170 Market St., Philadelphia, Pa.



## Second Hand Machinery.

### Specialties

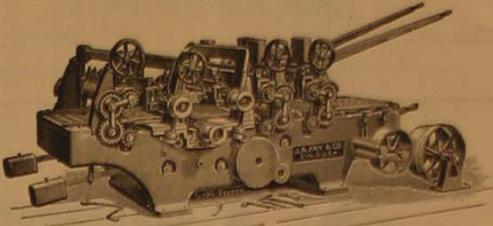
PULLEYS	BOILERS
SHAFTING	ENGINES
BELTING	HOISTERS
BOXES	STAMP MILLS
RAILS	CABLE and all but little used

### THE S. S. MACHINERY CO.

Denver, Colorado.

### J. A. FAY & EGAN CO. CINCINNATI, OHIO

### Wood Working Machinery



— FOR —

Box Factories, Planing Mills, Sash, Door & Blind Factories  
Carriage, Wagon and Agricultural Shops.

HENSHAW, BULKLEY & CO., Agents, San Francisco, Cal.

## Ores! Ores! Ores!!

Gold, Silver and Lead Ores and Concentrates

Purchased at Reduced Rates for Treatment.

### Selby Smelting and Lead Co.

416 MONTGOMERY ST., San Francisco

Consign Shipments to Vallejo Junction, Cal.

### Randsburg Gold Fields REACHED VIA

### Santa Fe Route

Leave Los Angeles, 8:50 a. m.  
Leave San Bernardino 12:25 p. m.  
Arrive Barstow 3:25 p. m.  
Leave Barstow 3:50 p. m.  
Arrive Kramer, 5:05 p. m.  
Arrive St. Elmo, 6:25 p. m.  
Arrive Johannesburg 6:50 p. m.

Returning Trains Leave  
Johannesburg 9:00 p. m.  
Arrive San Bernardino 5:45 a. m.  
Arrive Los Angeles, 8:25 a. m.

A through passenger coach is run between Barstow and Johannesburg.

Through tickets and particulars of any Santa Fe Route Agent.

Stage leaves Johannesburg for Ballarat on Sundays and Thursdays at 7 a. m.; returning arrives at Johannesburg on Tuesdays and Fridays at 8 p. m.

SAN FRANCISCO OFFICE  
628 MARKET ST.

LOS ANGELES OFFICE  
200 S. SPRING ST.

**JEFFREY**  
ROLLER, STEEL AND SPECIAL CHAINS.  
**ELEVATORS**  
AND  
**CONVEYORS**  
FOR HANDLING MATERIAL OF ALL KINDS.  
WIRE CABLE CONVEYORS.  
For long and short distance conveying.

THE JEFFREY MFG. CO.  
Columbus, Ohio.  
Send for Catalogue.

41 DEY STREET,  
NEW YORK.

WESTERLY BRANCH, 412 17th Street,  
DENVER, COLORADO.

### Electric Blasting Apparatus.

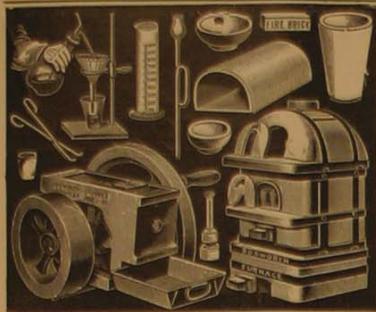


railroad quarrying, and mining works.

VICTOR BLASTING MACHINE. Fires 5 to 8 holes; weighs 15 lbs; adapted for prospecting, etc.

MANUFACTURED ONLY BY

JAMES MACBETH & CO., 128 Maiden Lane, New York, U. S. A.  
BRANCH OFFICE: 308 MARKET STREET, SAN FRANCISCO, CAL.



## THE Denver Fire Clay Co.

Assayers' and Chemists' Supplies

MANUFACTURERS OF  
Crucibles, Scorifiers and Muffles  
and all other kinds of  
FIRE CLAY MATERIAL

SPECIALITIES—Strictly c. p. Acids Test  
Lead, Bone Ash, Cyanide Potash, Argol,  
Borax, Borax Glass, Iron Sulphides, Litharge,  
Soda, Mining Fluxes, etc.

SOLE AGENTS FOR THE  
Ainsworth Balances

Factory:

3101-3141 Blake St., 1742-1746 Champa St., Denver, Col.

Office:

## NEW HAVEN MFG. COMPANY

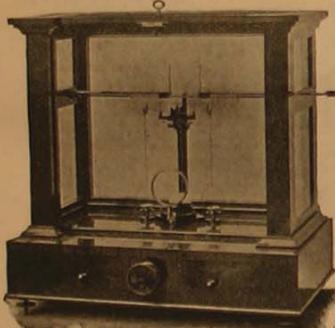
NEW HAVEN, CONN.

### IRON WORKING TOOLS,



Engine Lathes, Pulley Turning Lathes, Iron Planers  
Slotters, Upright Drilling Machines, Horizontal  
Drilling and Boring Machines, Etc.

HENSHAW, BULKLEY & CO., Agents, San Francisco, Cal.

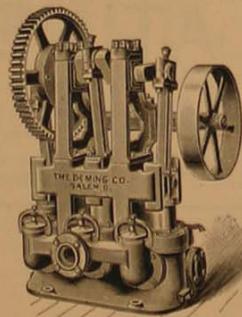


## THE DEMING

### TRIPLEX POWER PUMP

The Best Made

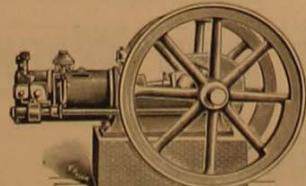
Steel Crank Shafts, Cut Gearing, Outside  
Packed Plungers, Single and Double  
Acting Triplex Electric Pumps



### THE OTTO GAS ENGINE

51000 IN ACTUAL USE

The Original, the Highest Efficiency and  
Most Economical



### AINSWORTH NO. 043

Sensitivity. - - - 1-100 Milligramme

Ten inch beam on which you can weigh from  
1-100 to 1 Milligramme with a 1 Milligramme  
rider.

Wm. AINSWORTH & SONS  
1281 LAWRENCE ST. DENVER, COLO.

Henshaw, Bulkley & Co.,

AGENTS

SAN FRANCISCO, CAL.



## TANKS

OF EVERY DESCRIPTION

FOR  
Mines, Mills and Cyanide Plants  
Patent Non-Shrinking WaterTanks

The only Tank that will stand the Desert  
and Hot Climate.  
Write for Catalogue and Estimate on any kind  
of Tank Work.

Pacific Tank Co.

348 E. 2ND ST., LOS ANGELES, CAL.  
35 BEALE ST., SAN FRANCISCO, CAL.

## To Gold Miners! Silver Plated Copper AMALGAMATING PLATES

For Saving Gold In Quartz and Placer Mining.  
EVERY DESCRIPTION OF MINING PLATES MADE.  
Only Best Copper and Refined Silver Used, Old Min-  
ing Plates Replated. Twenty-six Medals Awarded.

Gold, Silver, Nickel, Copper & Brass Plating.

Old copper mining plates bought or taken in exchange for new  
silver-plated plates and full value allowed. Gold extracted from old  
plates at a moderate cost by a new and economical process. Old plates,  
which often contain a surplus of gold above the cost of plating, can be  
re-plated.

DENNISTON'S San Francisco Plating Works

652 Mission Street, cor. Annie, San Francisco, Cal.

Telephone, Main 5931.

Proprietor

E. G. DENNISTON,

Send for Circular.

## R. A. PEREZ, E. M.

Assayer and Chemist

Manager of the Bi-Metallic Assay Office and Chemical Laboratory  
Assaying of Ores, Furnace Products, etc.

Amalgamations and Cyanide Tests Carefully Made

Formerly: Underground and surface surveyor for the Coahuila and Alamo Coal Cos.,  
Coahuila, Mexico.

Assistant Chemist for the Wharton Iron Furnace, Port Orford, N. J.

Chief Assayer for El Paso Smelting Works, El Paso, Texas.

Assistant Chemist Consolidated Kansas City S. and R. Co., Argentine, Kan.

12c North Main Street,

Los Angeles, Cal.

ESTABLISHED 1859

## Herman Kohlbush Sr.

59 Nassau Street,  
New York, N. Y.

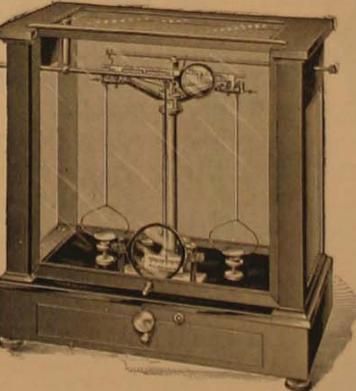
MANUFACTURER OF

### Fine Balances and Weights

For every purpose where accuracy  
is required.

• • •

Send for Illustrated Catalogue



## THE WILSON

Forged High Grade Steel

### Shoes and Dies

Guaranteed to Wear Longer and Prove Cheaper than any others.  
Made by use of Special Appliances. Patented Aug. 16th, 1893.

Made only by

WESTERN FORGE AND ROLLING MILLS

St. Louis, Missouri

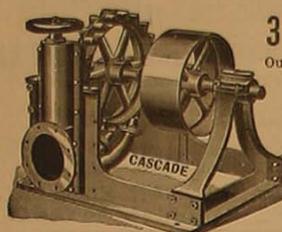
JOSHUA HENDY MACHINE WORKS

SOLE AGENTS

San Francisco, Cal.

38 to 44 Fremont Street,

# Turbine AND Cascade WATER WHEEL



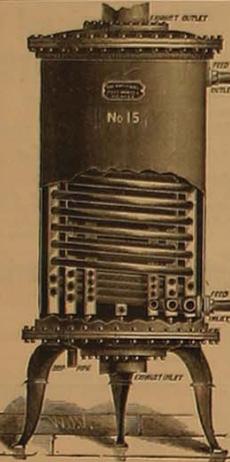
Adapted to all Heads from

3 Feet to 2000 Feet

Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

James Leffel & Co.,  
SPRINGFIELD, OHIO, U.S.A.



## The National Feed Water Heater

Highest Premium at World's Fair

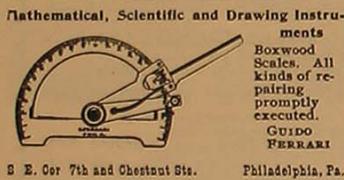
800,000 HORSE POWER IN USE

SIMPLICITY  
CHEAPNESS  
RELIABILITY  
EFFECTIVENESS

Henshaw, Bulkley & Co.,

Agents.

SAN FRANCISCO, CAL.



Mathematical, Scientific and Drawing Instruments  
Boxwood Scales. All kinds of repairing promptly executed.  
GUIDO FERRARI  
S. E. Cor 7th and Chestnut Sts. Philadelphia, Pa.



FOR DRAWING INSTRUMENTS:  
THEO. ALTENEDER & SONS,  
945 RIDGE AVE., PHILADELPHIA.  
SEND FOR CATALOGUE

# OLIVER'S POWDER METEOR DYNAMITE

Extra Strength for Heavy Rock Work and Ore Mining



The OLIVER POWDER CO.,  
OLIVER MILLS,  
LUZ. COUNTY, Penn.

SUPERIOR STRENGTH  
FREEDOM  
FROM SMOKE

## GELATINE

For Tunnel Work—free from  
Obnoxious Odors

## OLIVER'S

FLAMELESS  
DYNAMITE

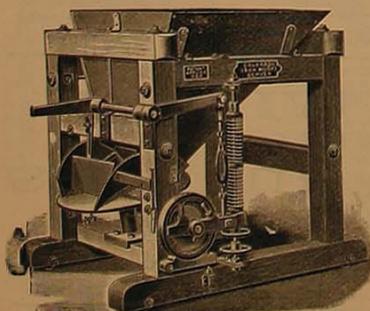
Will not Ignite Gas or Coal Dust. Does not shatter coal  
ALL GRADES OF MINING POWDERS A SPECIALTY

Mining, Milling, Smelting,

Concentrating, Chlorination,

and Leaching Machinery

ESTABLISHED 1860



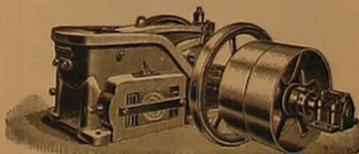
CHALLENGE ECLIPSE ORE FEEDER

Will feed both wet and dry ores

THE COLORADO IRON WORKS COMPANY

DENVER, COLORADO.

MANUFACTURED BY



CATALOGUE ON APPLICATION

BLACK HAWK ORE BREAKER

## GOLD and SILVER REFINERS & ASSAYERS.

Bullion Bought. No charges for parting. Gold \$20.00 per oz. Silver and Platinum at market prices. Assaying in all branches. Working tests made by all processes. Wastes and Concentrates bought. Prompt attention. Best Services. Your Trade Solicited

Penn Smelting and Refining Works, 901-903 Filbert st, PHILADELPHIA, PA.



## PERFORATED SCREENS

Steel Plate, Copper and Bronze

For all uses. Send for Catalogue  
A. J. BECKLEY & CO.,  
Works, Garwood, N. J.

New York Office, 123 Liberty Street,

L. Manasse Company

Mfg. Opticians

88  
Madison Street  
Chicago.

Manufacturers and  
Importers of  
Architects,  
Engineers and  
Surveyors  
Supplies.



Optical instruments of  
every description. Barometers,  
Thermometers, Field Glasses, etc.  
Catalogues on application.

## JOHN. T. REED

### Assayer and Analytical Chemist

Assays made for all valuable metals. Assays made of all valuable minerals. Special attention given to the sampling of mines. Estimating the value of and testing the nature of their ores. 100 pound lots of ore sampled, and working tests made by Cyanide, Amalgamation and Chlorination Processes.

OFFICE 522 COURT STREET,

San Bernardino, - - - California

## ORE TESTING

Complete mill for testing ores on practical scale by all processes to determine the best process adapted to treating any ore submitted. Processes in use investigated to overcome unnecessary losses, etc.

RICKETTS & BANKS,

Metallurgists & Chemists,

NEW YORK CITY

No. 104 JOHN STREET,

ESTABLISHED 1860



Governor and Belt, Fly Wheel, Driving Pulleys, Glass Oil Cups, Drain Cocks and Sight Feed Lubricator furnished with Engine. From four to twenty horse power.

Globe Machine Works,  
135-139 W. 20 ST. CINCINNATI, OHIO

## Perforated Metals

GRIZZLEYS FOR PLACER MINING, BATTERY SCREENS  
STEEL SHEETS FOR TROMMELS.

THE ROBT. AITCHISON PERFORATED METAL CO.,  
269 Dearborn St., Chicago, Illinois

FRANCIS SMITH & CO.,

MANUFACTURERS OF

## SHEET IRON & STEEL PIPE

MINING PIPE ALL SIZES

### Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all Sizes.

Iron cut, punched and formed, or making pipe on ground where required. All kinds of tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

46 Fremont Street

San Francisco, Cal.

HOME MANUFACTURE

FOWLER'S  
Air Space and Asbestos  
Manufacturing Company

Sectional Removable Covering  
for Steam Boilers, Pipes, etc.  
As a Non-Conductor, Unequalled  
Absolutely Fire Proof



G. C. FOWLER, 656-58 Howard Street  
SAN FRANCISCO, CAL.

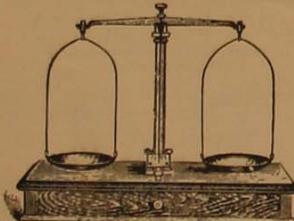
## C. DUCOMMUN,

300-302 N. MAIN STREET,

LOS ANGELES

### Assayers Material Mine and Mill Supplies

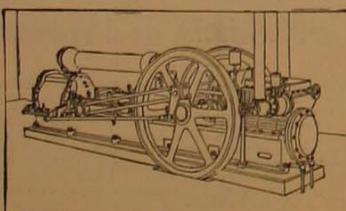
Dixon's Black Lead Crucibles, Denver Fire Clay Crucibles, Muffles, Scorifiers, etc.; Quicksilver, Drill Steel, Retorts, Mortars, Gold Pans, Drilling Hammers, Drifting Picks, Horn Spoons and Shovels.



## NORWALK IRON WORKS CO.

SOUTH NORWALK, CONNECTICUT.

### THE NORWALK AIR and GAS COMPRESSOR



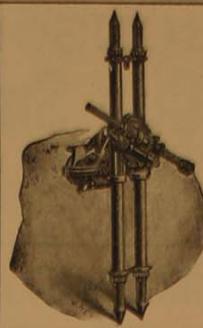
and Other Mining Machinery. The Best Machine for Compressing Air for all Dynamic Purposes. Send for Illustrated Descriptive Catalogue.

HENSHAW, BULKLEY & CO., Agents San Francisco

#### Especially Designed for Driving

ROCK DRILLS,  
PNEUMATIC LOCOMO-  
TIVES, ENGINES, PUMPS  
COAL CUTTERS.

In use in every State in the Union, Central America, and South America, Great Britain, etc., Also used by the U. S. Army and Navy.



## DIAMOND Prospecting Drills

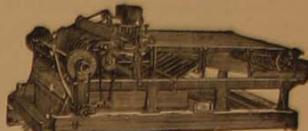
Machines of all Capacities

American Diamond Rock Drill Co.,

P. O. Box 1442

120 LIBERTY ST., N. Y.

## WOODBURY CONCENTRATOR



223 First St., San Francisco, Cal.



### Quartz Screens

A specialty. Round, slot or buried slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145-147 Beale St., S.F.

### Analytical Chemists and Assayers

\* Analysis made of ORES, Water, Chemicals, Clays, &c. Umpires Work a Specialty  
HAMMON & MORRISON,

144 Chestnut Street. PHILADELPHIA, PA.

## Gold, Silver, Iron, Copper, Zinc and Lead MINES

PARTNER WANTED. (Miner Preferred) who would invest \$20,000 in developing five large mining properties located in the Territory of Tepic, on the Pacific Coast. The Gold Mines ore averages from 3 oz. to 30 oz. per ton of 2,000 lbs. Silver, from 1 kilo to 38 kilos. Lead, from 15 per cent. to 31 per cent. Zinc, 20 per cent; Copper from 5 per cent. to 25 per cent.

Water Falls, 500 H. P., and sufficient timber for mining use, close to the mines.

Maps, reports, and Samples sent on application. Call on or address to

Lic. Elias Galindo,  
Iturbide St., No. 94 Tepic, Mexico

## P. & B. PAINT

FOR MINES, SMELTERS, CHLORINATION WORKS,  
THE CYANIDE PROCESS.

P. & B. Roofing put up in Rolls to lay 200 square feet, with Paint and Nails. Absolutely Acid and Alkali Proof.

PARAFFINE PAINT CO., Manufacturers, 312-314 W. 5th St., Los Angeles

### UNFAIR COMPETITION

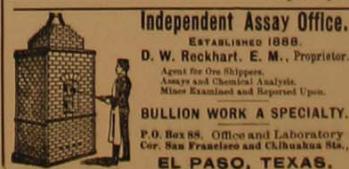
Our recent announcement that inferior goods had been sold and billed on the Coast as our goods, and that our trademark numbers had been counterfeited, has disclosed an even greater extent of these practices than we had supposed to exist. To make the resulting damage to the reputation of our goods as small as possible and to protect our would-be patrons we repeat:

All our catalogue goods, except those listed by us as manufactured by others, are stamped with our name "Keuffel & Esser Co." or our initials "K. & E. Co." and where there is room for it, with our trademark. Our German drawing instruments bear only the trademarks  and  only, and goods so stamped are therefore not ours. All our goods are fully warranted to conform to the description we give of them in our catalogue and to be of the quality and grade specified. We make some lines of cheaper goods for the jobbing trade, but they differ from our catalogue goods in quality and appearance. These inferior goods are not stamped with any of our trademarks. Our catalogue goods are not furnished to any dealer or agent without our complete stamp as described above, and any claim that we furnish our catalogue goods by special arrangement without our stamp is therefore an attempt to deceive. Our special papers in rolls or sheets

### Duplex Universal Anvil Paragon Normal

are watermarked or stamped along the edge with their name. Any claims that our papers are furnished by us in bulk without these names or that these papers have been obtained otherwise than through us, are absolutely false. We will thankfully accept any information bearing on the counterfeiting of our trademark numbers or the palming off of other goods as ours.

Very respectfully, KEUFFEL & ESSER CO., New York



### Independent Assay Office.

ESTABLISHED 1888.

D. W. Rockhart, E. M., Proprietor.  
Agent for Ore Shippers.  
Assays and Chemical Analysis.  
Mine Examination and Reported Upon.

BULLION WORK A SPECIALTY.  
P. O. Box 88, Office and Laboratory  
Cor. San Francisco and California Sts.,  
EL PASO, TEXAS.

### GASOLINE ENGINES

Gasoline Engines from 2 to 10 horse power. Mine ventilators operated by Gasoline Engines.

TEMPLE MACHINE CO.,  
1513 Wazee Street, Denver, Colorado

## Buyers of

ALL CLASSES OF  
BULLION, MATTE,  
ORE, SILVER SUL-  
PHIDES,  
CYANIDES, GOLD  
and SILVER BARS.

# CONSOLIDATED Kansas City Smelting AND Refining COMPANY

SMELTING WORKS  
LEADVILLE, COLO.; EL PASO, TEXAS;  
ARGENTINE, KAN.; BOQUILLAS, MEX.

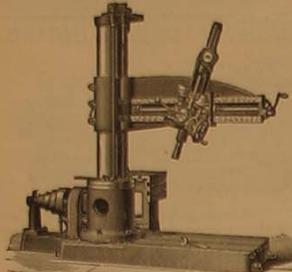
REFINERY:  
ARGENTINE, KANSAS

ORE PURCHASING AGENCIES:  
C. D. Porter, Spokane Wash.; J. H. Weddle, Leadville, Col.  
J. H. Murray, Denver, Colo.; L. P. Feustman City of Mex.  
J. E. Jackson, Salt Lake City Utah; H. R. Simpson, El Paso, Texas; C. E. Pinney, Argentine, Kansas.

## Manufacturers of

ALCHEMIST-  
BRAND  
BLUE VITROL,  
ZINC SULPHATE

## Half Universal Radial Drills



The special features which have so highly recommended this style of Drills are our double columns, steel gearing, power and hand feeds, quick return motion to spindle. Furnished in three sizes, with large variety of tables, adapting the drills for every class of work possible.

**Bickford Drill and Tool Co.**

CINCINNATI, OHIO, U. S. A.

HENSHAW, BULKLEY & CO., AGENTS

San Francisco, Cal.

### ORE CARS.

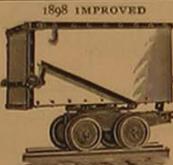
All miners who have used the **Truax Automatic Ore Cars** say they are the best in the market.

Over 3,000 In Use

MANUFACTURED IN

SAN FRANCISCO, CAL., by

**The Truax Mfg. Co.,**  
114 First Street



PATENTED:  
Jan. 8, 1892. Aug. 7, 1895.  
July 19, 1895.  
In Canada, June 21, 1895.

1898 IMPROVED  
MANUFACTURED IN  
DENVER, COLORADO, by  
**The Truax Mfg. Co.**  
1717-1719 Wazee St.

We make all kinds of cars, skips and charging cars for the Mine, Mill and Smelter. All miners should have our pamphlet of useful information.

Dealers wanted in Mining Sections to handle the TRUAZ ORE CARS.

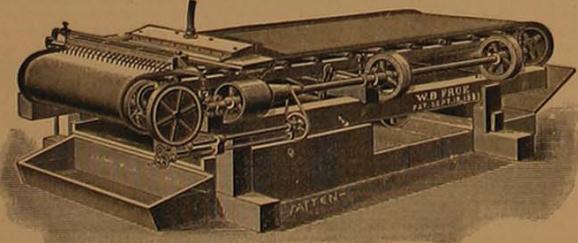
**THOMAS PRICE & SON**

Analytical Metallurgical and Physical Testing Laboratory

524 SACRAMENTO STREET, SAN FRANCISCO, CAL.

## FOUR and SIX FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts



After a concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the world." More Frue Vanners have been sold during the last 12 months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "Standard" which all competitors are trying to imitate.

The results obtained by this machine are the "Acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it, and the manufacturers will tell you that they are "just as good, and cheaper, etc." The facts are that no other concentrator made has an equal capacity, or will yield as clear a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the years results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e. Clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska Treadwell Mine where they have ordered over 350 Frue Vanners one man attends 48 machines for 12 hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

**JAS. S. BROWNELL, Western Agent**

132 Market Street,

**FRUE VANNING MACHINE CO.**  
(Successor to Adams & Carter)

SAN FRANCISCO, CAL.

### MINERS' OUTFITS.

IRON MORTARS,  
AMALGAM MORTARS,  
GOLD WASH PANS,  
MINERS' HORNS,  
BATEAS, CRUCIBLES,  
HORSE-SHOE MAGNETS,  
MAGNIFYING GLASSES,  
IRON RETORTS,  
CHEMICALS, SCALES,  
WEIGHTS, ETC.

Including a full assort-  
ment of Mine and  
Mill Supplies, Assay-  
ers' Materials, Etc.

Sole Agents for the  
Pacific Coast for the

**W. S. TYLER WIRE WORKS CO.**  
Manufacturers of

Steel and Brass Wire Battery Screens  
Agents for Baker & Adams' Chemically  
Pure Acids. A full Stock always  
on hand.  
Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr.  
1.36; Sulphuric Acid, sp. gr. 1.845.

**JOHN TAYLOR & CO.**  
63 FIRST ST., SAN FRANCISCO

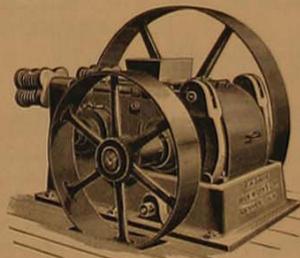
Prices on application.

**The F. M. Davis  
IRON WORKS CO.**

Office and Works 723 to 743 Larimer Street

Corner 8th Street, DENVER, COL.

**The DAVIS CRUSHING ROLLS**



**SIMPLE, DURABLE, EFFICIENT**

These machines are built in 5 sizes  
27" x 14". Belt Driven, \$950.00. Weight  
13,000 pounds.

SEND FOR CATALOGUES AND DISCOUNTS.

3



## Robins Belt Conveyor

Handling 1100 tons per hour  
of Rock and Gravel on Dredger.

Our New Catalogue Just Issued.

**Robins Conveying Belt Co.**

147 Cedar Street, New York City

**GOODSELL'S "98"  
& PUMP PACKING**



**WAX END SEWED.**

Patent Pending

No possibility of Splitting. All imperfect features of Duck packing overcome. Price 75c lb net.

**Goodsell Packing Co.,**

SOLE MAKERS

33 South Canal Street Chicago, Illinois

### SWEEPINGS ★

Metallic Wastes, Dental Scraps,  
Photographers' Wastes,  
Jeweler's Sweeps, Mill Wastes,  
Amalgamated Plates, Old Iron Retorts,  
Old Quicksilver bought.

A. M. DONALDSON & CO.,  
1661 Larimer St., Denver, Colorado

## The Little Alaska Gold Washer

A simple, practical, indestructible gold washer, combining the principles of gravity and centrifugal motion, and at a price and weight far below any washer ever invented. In working the operator does not have to wet his hands nor hold the weight of the dirt in his arms. These washers have been used on the desert for the last 18 months with water \$1.50 per barrel. Under ordinary conditions the rate of working is a pan a minute, and under all conditions the result is always the same IT SAVES ALL THE GOLD.

Send for catalogue and information to

**RUSSELL & KINSEY,**

204 South Broadway,

Los Angeles, Cal.



THE  
**CUMMER**  
DRYERS.

FOR DRYING ...  
... EVERYTHING  
MECHANICALLY

Concentrates, ores, coal, bricks, clay, etc.  
No Steam is used.

Hundreds in Operation

F. D. CUMMER & SONS CO.,

CLEVELAND, OHIO

State Ore Sampling Co.

DENVER, COLORADO

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt molybdenite and Antimony Ores.

We have modern mills for sampling ore. We also test ores for the new processes of reduction. Our long experience in the market enables us to pay the highest cash prices for all marketable ore. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers

Horace F. Brown, M. E.

Mechanical Roasting, Cooling and Conveying of Ores. Automatic milling plants adapted to standard processes.

699 Washington Boulevard CHICAGO, ILL.

READ OUR

WANT ADS

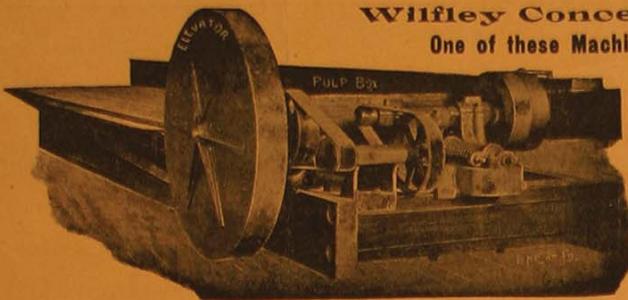
PAGE 8a

**WHITE, ROGERS & COM'Y.**  
CONSTRUCTING ENGINEERS AND MILLWRIGHTS

306 PINE STREET, SAN FRANCISCO, CAL.

Williley Concentrator, Price \$450 f.o.b. San Francisco

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do very much better work.



We furnish superior Machinery and erect Stamp Mills, Hoisting and Pumping Works operated by Steam or Water Motors. Complete Concentrating and Smelting Plants for the concentration and recovery of gold, silver, copper and lead. Improved Power Drills and Air Compressors, Wire Rope Tramways, etc.

The Williley Table is fully covered by U. S. Patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

These Machines are Kept in Stock Ready for Immediate Shipment

**THE NATIONAL IRON WORKS**

**IRON & STEEL**  
**WATER PIPE & WELL CASING**

Riveted Boilers, Tanks, and Sheet Steel or Iron Work of every description.

MANUFACTURER OF THE

Repairing of All kinds Promptly Attended to.

PORTLAND, OREGON

National Steel Ore Car

Repairing of All kinds Promptly Attended to.

PORTLAND, OREGON

**FULTON ENGINE WORKS**  
Mining, Milling & Smelting Machinery

Estimates Furnished on all Classes of Mining Work

P. O. Box 296, STATION "C"

LOS ANGELES, CALIFORNIA

**BULLOCK DIAMOND DRILLS**

If you are interested in prospecting, send for our new Catalogue No. 33.

**BULLOCK MINING MACHINERY**

Hoists and Haulage Plants, Mine Ventilators, Cars, Skips, Gages.

Write for What You Want.

PARKE & LACY CO., AGENT  
306 BYRNE BLDG., LOS ANGELES, CAL.

M. C. BULLOCK MFG. CO.,  
1169 W. LAKE ST., CHICAGO, U.S.A.

Established 1887

B. Sc. Members American Chemical Society

**WADE & WADE ASSAYERS**

Chemical Analysis, Milling, Concentration and Cyanide Tests

Call and See our Stamp Mill and True Vanner 115 1/2 N. MAIN ST., LOS ANGELES, CAL.

**Cyanide Potassium**

99 per cent. pure, Beckton Brand.

MADE BY THE

Gas Light and Coke Co., London,  
AND ALL OTHER CHEMICALS.

Please Apply to **Schoelkopf, Hartford & MacLagan, Ltd.**,  
100 William St., NEW YORK.

JENA

Normal  
Glass

Trade Mark  
SCHOTT & GEN.

BEST  
GLASS  
FOR  
Labora-  
tory use  
JENA

CHEMICALS AND  
CHEMICAL APPARATUS

ASSAY BALANCES

Finest Ever Made

Specialties:—Analytical Portable Balances, Porcelainain, Platinum goods, Crucibles, Cupels, Scorifiers, Muffles, Furnaces, C. P. Acids, etc.

Everything Necessary for Assayers

Elmer & Amend,

3d Ave. Cor. of 18th St. New York

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

American Injector Co., Detroit, Mich.  
U. S. A.

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

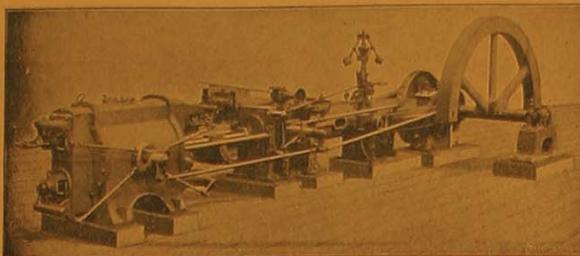
A. H. HANDLAN,  
President and Manager

E. W. HANDLAN,  
Secretary and Treasurer

Mitchell Staver & Lewis Co., Portland, Or.  
Mitchell Staver & Lewis Co., Seattle, Wash.  
Schaw-Ingram Batcher Co., Sacramento, Cal.  
Henshaw, Bulkley & Co., San Francisco, Cal.  
And of Jobbers and Dealers generally.  
Catalogue Free.

## FRASER &amp; CHALMERS

133 Fulton Street,  
Chicago, Illinois, U. S. A.  
43 Threadneedle Street,  
E. C., London, England



## Mining Machinery

STAMP MILLS  
ROCK CRUSHERS  
HUNTINGTON MILLS  
SMELTING FURNACES  
GRAY'S PATENT MINE CHAIRS  
CONCENTRATORS  
HOISTING ENGINES  
ROASTING FURNACES  
BALL PULVERIZERS

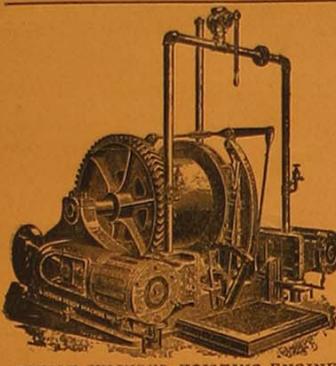
Exclusive Manufacturers of  
RIEDER PUMPS and  
AIR COMPRESSORS

FOR

UNITED STATES, CANADA,  
MEXICO, SOUTH AMERICA,  
ENGLAND, SOUTH AFRICA  
AND AUSTRALIA.

The accompanying picture shows the Air Compressor we make

Fraser &amp; Chalmers, GENERAL AGENTS FOR GREEN BLOWERS



DOUBLE CYLINDER HOISTING ENGINE

## JOSHUA HENDY MACHINE WORKS,

Nos. 38 to 44 Fremont St.  
SAN FRANCISCO, CAL.

Manufacturers of and Dealers in

## The Latest Improved

Quartz Milling, Pumping, Hoisting and Smelting  
Plants, Air Compressors and Rock Drills."HENDY" IMPROVED "TRIPLE-DISCHARGE" TWO-STAMP QUARTZ MILLS  
Boilers, Engines & Pumps of all capacitiesPLANS, SPECIFICATIONS and ESTIMATES of COST SUBMITTED and CONTRACTS ENTERED INTO  
FOR FURNISHING and ERECTING MINING and MILLING PLANTS for all conditions of Use.

## BAKER IRON WORKS

LOS ANGELES, CALIFORNIA

Manufacturers of  
Mining and Milling Machinery. Atlas Engines and Boilers, Worthington Steam PumpsWater Works Machinery  
A SPECIALTY

ESTABLISHED 1871

C. L. BERGER & SONS  
Successors to

BUFF &amp; BERGER

Mining and

Engineering Transits

With patent interchangeable auxiliary, Telescope for use on top or side in vertical sighting. Our friends are cautioned against infringements foreign or domestic as attempts have been made of late to mislead the public.

Send for Illustrated Catalogue and Manual  
11 Province Court, - Boston, Mass.

## ANTIMONY.

We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.

Chapman Smelting Works Co.,  
(INCORPORATED)  
422 Battery Street. San Francisco, CaNEW STANDARD CO.  
INCORPORATED  
Manufacturers of the  
CONCENTRATOR  
323 POTOMAC BLOCK, LOS ANGELES, CAL

## MINE AND MILL SUPPLIES

Steam and Gasoline Engines and Hoists

Giant Rock Drills  
Ore Cars and Drills. Iron and Steel.JOHN WIGMORE & SONS CO.  
117-123 South Los Angeles St., Los Angeles, Cal.

## Mining Timbers and Construction Lumber

(Caleasieu Long Leaf Yellow Pine Lumber)

Prices given for delivery to any point in Mexico by Rail through Porfirio Diaz, Nuevo Laredo or Paso del Norte, and by Vessel through Gulf Ports of Tampico and Vera Cruz.

Bradley-Ramsay Lumber Co.

LOUISIANA, U. S. A.

ADDRESS INQUIRIES FOR PRICES TO

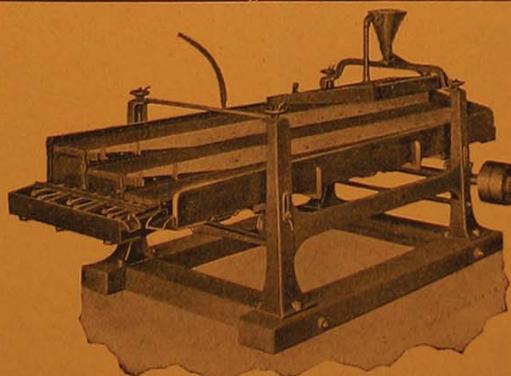
R. N. WATSON, AGENT.

APARTADO NO. 118 MONTEREY, N. L. MEXICO

THE BARTLETT  
CONCENTRATING  
TABLE

One of these Machines will take the place of  
TWO or THREE Belt Concentrators of any  
make and do as good work. Separates ALL the  
minerals from each other at one operation. Gives  
THREE CONCENTRATES on the one Machine at  
the same operation. The Machine is especially  
adapted to the separation of Zinc and Lead.

Price, 12-ft. Table, \$350

Shipping Weight 2200 Pounds  
Capacity, 10 to 20 tons per 24 hoursLicensee for the  
Manufacture and Sale

Parties desiring tests made can send 500  
lbs. or more, charges prepaid, and a run will  
be made and reports forwarded of the results  
free of all charges, except for the assay,  
which will not exceed \$10.00.

CAN BE SET UP ANYWHERE.  
Requires No Special FoundationSole Agents for Ingersoll-Sergeant Rock Drills and Air  
Compressors, Knowles Pumps and Pulsometer Pumps,  
Bullock Diamond Drills.Los Angeles, Cal. Office,  
W. H. Miller, Representative  
306 Byrne Building21 and 23 Fremont Street  
SAN FRANCISCO, CAL

PARKE &amp; LACY COMPANY,